



## Detailed Description Text - DETX (2):

The present invention is a real-time annotation system and methodology for annotating measurement displays in a signal measurement system that includes a graphical user interface for displaying waveforms and measurement results on a signal measurement system display. In one aspect of the invention, the annotation system is configured to enable an operator to graphically generate an annotation label containing any desired information and to position the annotation label at any desired location on the display, including positionally associating the annotation label with desired waveform(s) or waveform feature(s) displayed on the signal measurement system graphical user interface. The information may be predefined or represent real-time observations, and may be of any form, including textual and symbolic information. Preferably, the operator can also control the appearance characteristics of the rendered annotation label. It is also preferable that additional icons be available for inclusion in the annotation label to facilitate visual association with a desired waveform or waveform feature.

## Detailed Description Text - DETX (3):

FIG. 1 is a functional block diagram of an exemplary digital oscilloscope suitable for implementing the present invention. FIG. 1 is a functional block diagram of an exemplary computer-based system also suitable for implementing the present invention. Referring to FIG. 1, the digital oscilloscope 100 is a



US 6,320,577 B1  
Date of Patent: Nov. 20, 2001

Patent Number: 6,320,577 B1  
Inventor: Alexander J. Beyer  
Attorney: [illegible]

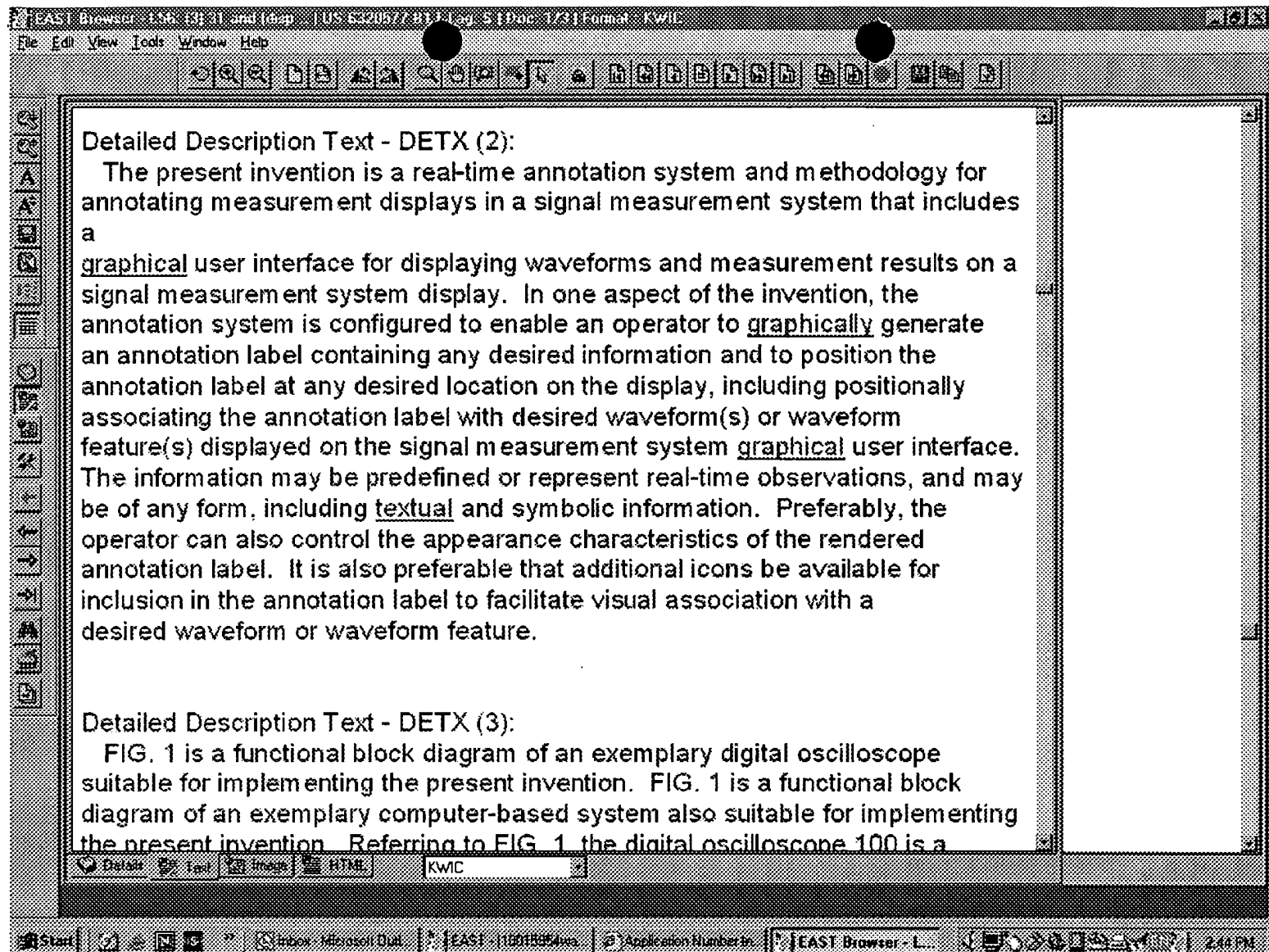
## ABSTRACT

System and methodology for real-time annotation of measurement displays in a signal measurement system that includes a graphical user interface for displaying waveforms and measurement results on a signal measurement system display. The annotation system is configured to enable an operator to graphically generate an annotation label containing any desired information and to position the annotation label at any desired location on the display, including positionally associating the annotation label with desired waveform(s) or waveform feature(s) displayed on the signal measurement system graphical user interface. The information may be predefined or represent real-time observations, and may be of any form, including textual and symbolic information. Preferably, the operator can also control the appearance characteristics of the rendered annotation label. It is also preferable that additional icons be available for inclusion in the annotation label to facilitate visual association with a desired waveform or waveform feature.

## Brief Description of the Drawings



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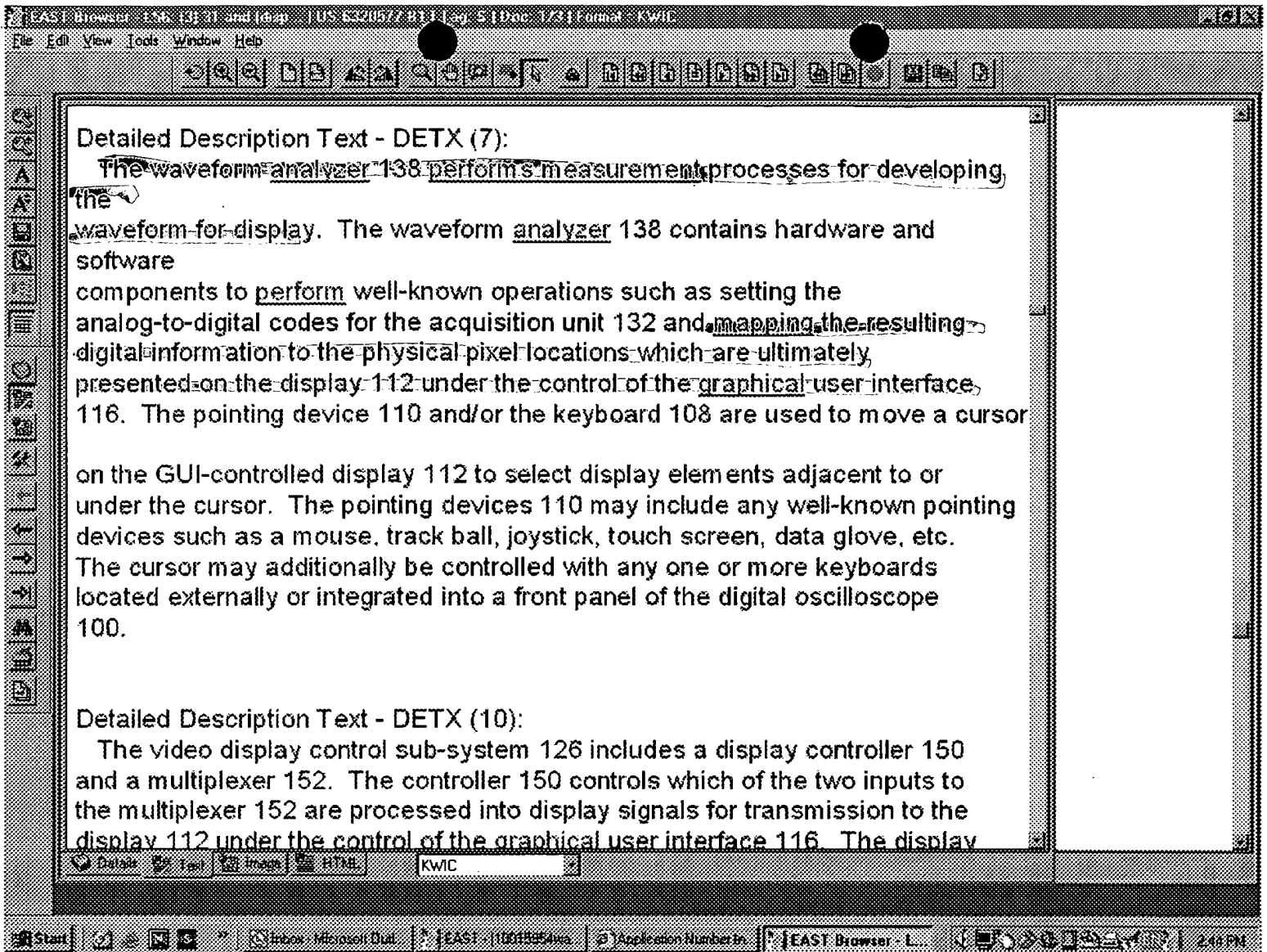


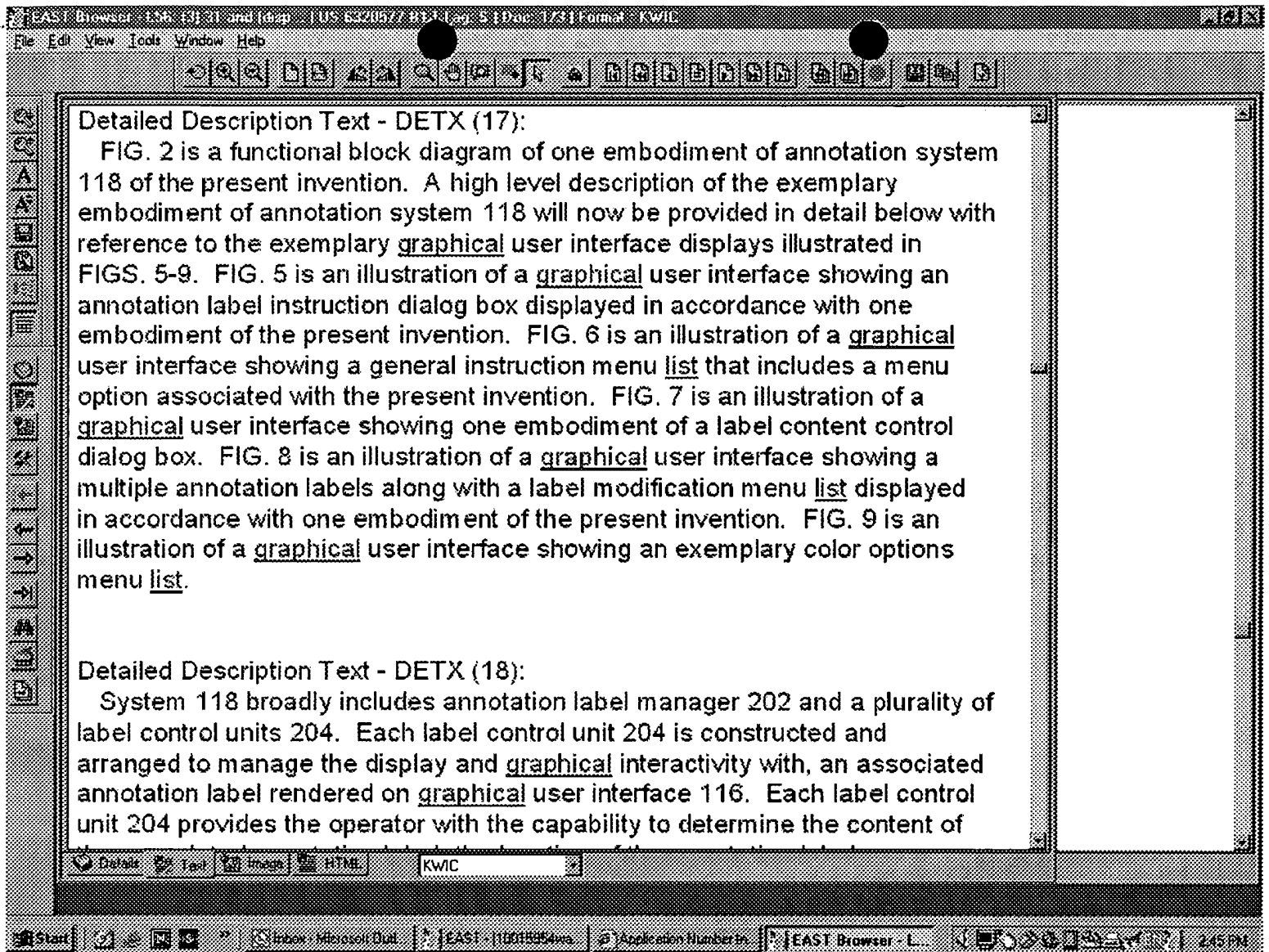
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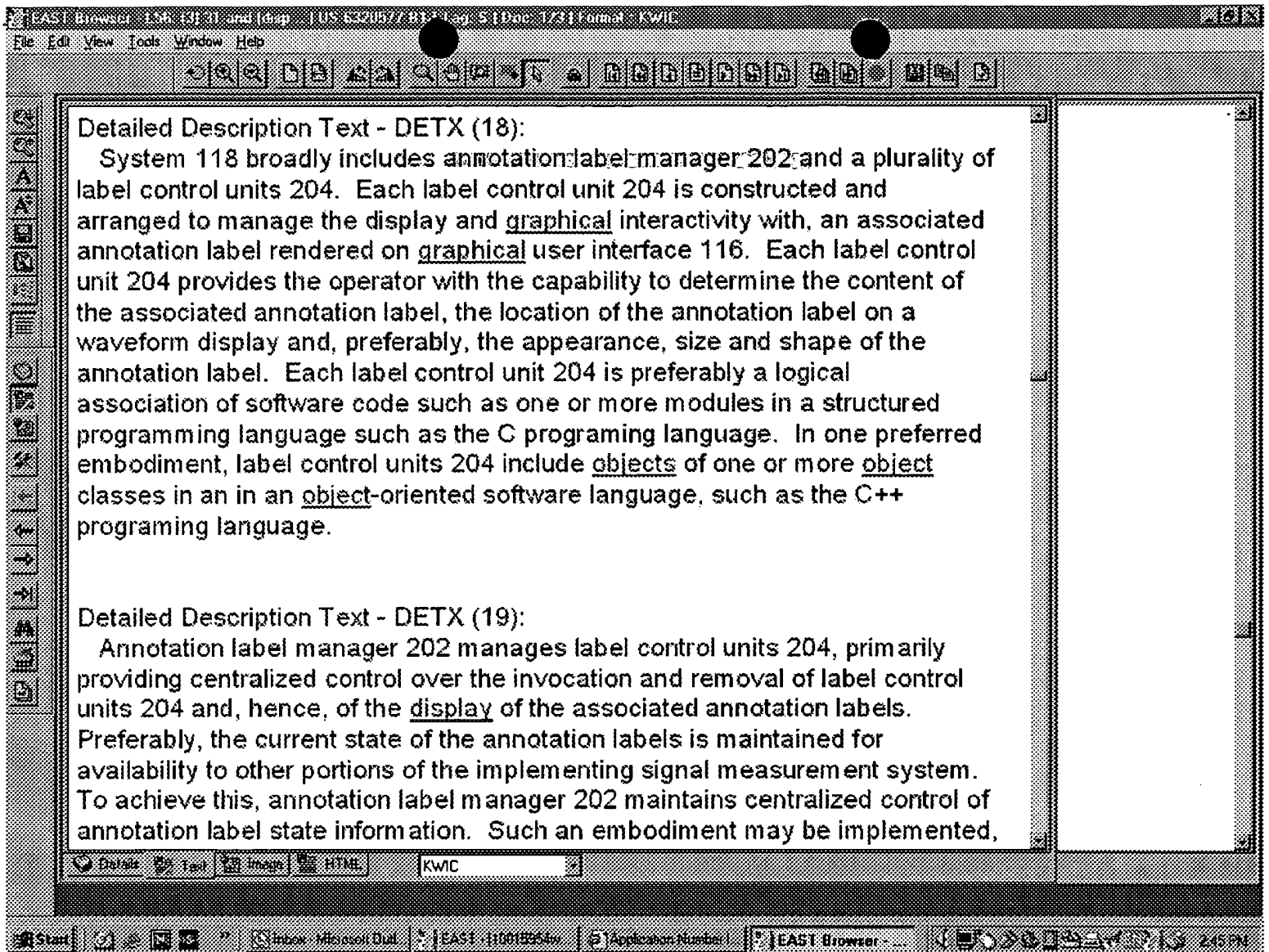
The present invention is a real-time annotation system and methodology for annotating measurement displays in a signal measurement system that includes a graphical user interface for displaying waveforms and measurement results on a signal measurement system display. In one aspect of the invention, the annotation system is configured to enable an operator to graphically generate an annotation label containing any desired information and to position the annotation label at any desired location on the display, including positionally associating the annotation label with desired waveform(s) or waveform feature(s) displayed on the signal measurement system graphical user interface. The information may be predefined or represent real-time observations, and may be of any form, including textual and symbolic information. Preferably, the operator can also control the appearance characteristics of the rendered annotation label. It is also preferable that additional icons be available for inclusion in the annotation label to facilitate visual association with a desired waveform or waveform feature.

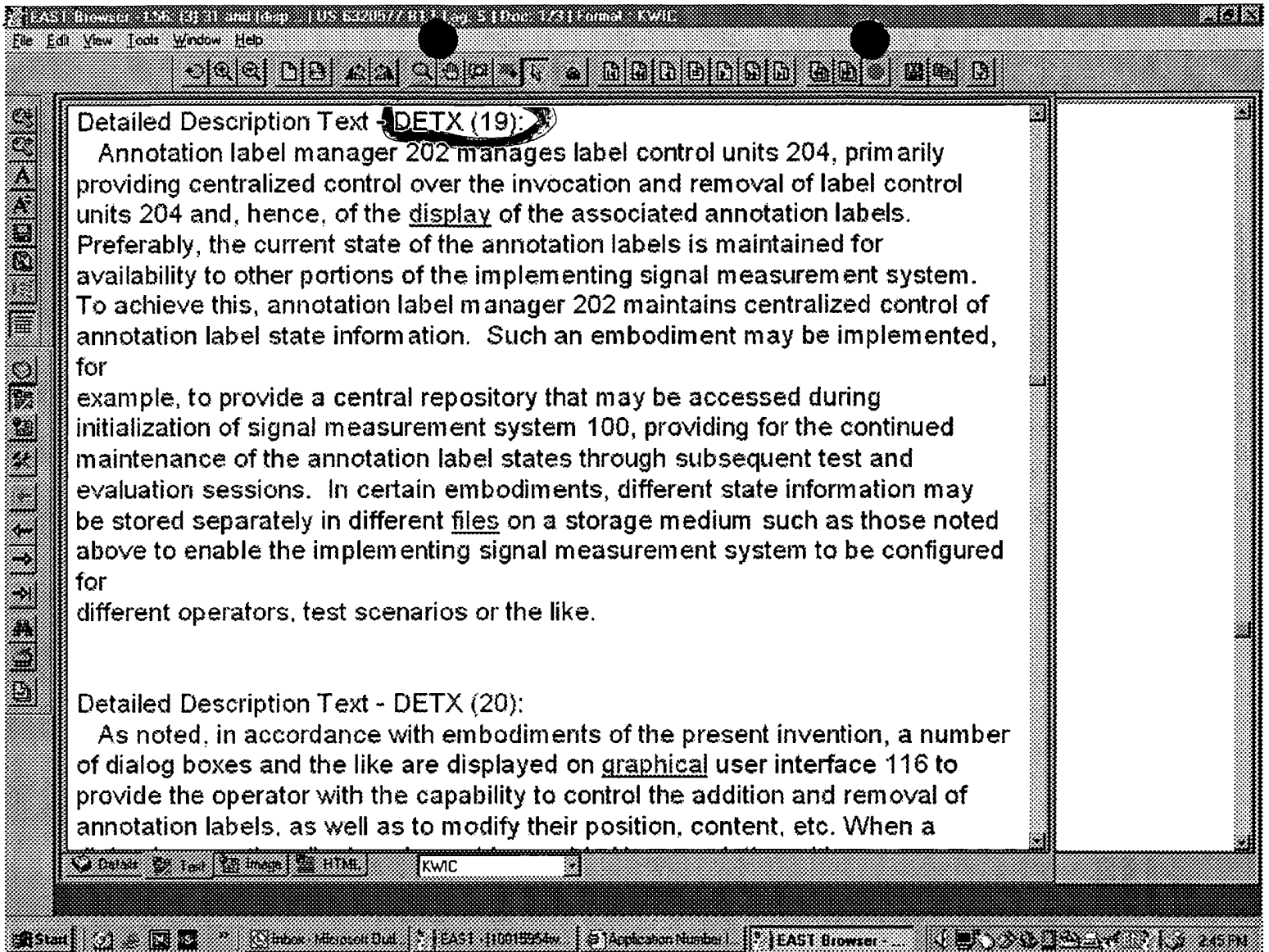
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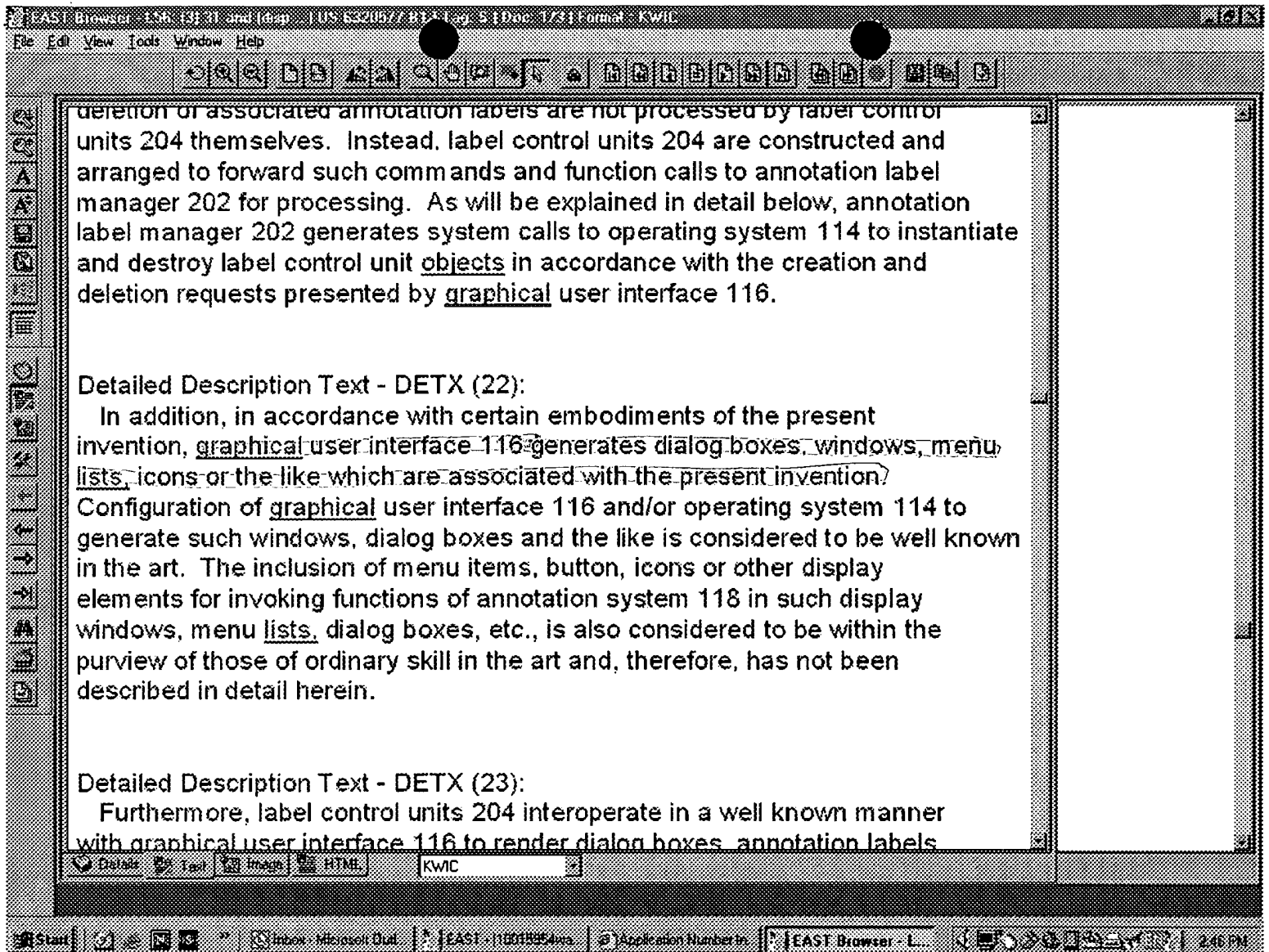
FIG. 1 is a functional block diagram of an exemplary digital oscilloscope suitable for implementing the present invention. FIG. 1 is a functional block diagram of an exemplary computer-based system also suitable for implementing the present invention. Referring to FIG. 1, the digital oscilloscope 100 is a











deletion or associated annotation labels are not processed by label control units 204 themselves. Instead, label control units 204 are constructed and arranged to forward such commands and function calls to annotation label manager 202 for processing. As will be explained in detail below, annotation label manager 202 generates system calls to operating system 114 to instantiate and destroy label control unit objects in accordance with the creation and deletion requests presented by graphical user interface 116.

Detailed Description Text - DETX (22):

In addition, in accordance with certain embodiments of the present invention, graphical user interface 116 generates dialog boxes, windows, menu lists, icons or the like which are associated with the present invention. Configuration of graphical user interface 116 and/or operating system 114 to generate such windows, dialog boxes and the like is considered to be well known in the art. The inclusion of menu items, button, icons or other display elements for invoking functions of annotation system 118 in such display windows, menu lists, dialog boxes, etc., is also considered to be within the purview of those of ordinary skill in the art and, therefore, has not been described in detail herein.

Detailed Description Text - DETX (23):

Furthermore, label control units 204 interoperate in a well known manner with graphical user interface 116 to render dialog boxes, annotation labels





### Detailed Description Text - DETX (81):

Preferably, the annotation label state information stored in data structure 320 is globally available. This information may then be recalled as part of the implementing system's set up procedure. This enables the setting established by an operator to be saved for subsequent uses of the implementing system. As one skilled in the art would find apparent, an operator can save system set up configurations. This causes the capture of designated states of the system. For signal measurement systems, for example, this includes all control settings, scale factors, active channels, and the like. In accordance with one embodiment of the present invention, the annotation labels are also stored and recalled as part of a previous set up for subsequent recall. This information may also be stored in individual files to implement different configurations for different circumstances, such as different test procedures, different operators, and the like.

### Detailed Description Text - DETX (83):

Referring now to FIG. 13, a single waveform display 504 is defined by its boundaries on the display 112. The origin of waveform display 504 is the upper left corner, designated as (x.sub.ro,y.sub.ro), where "r" represents that this is a waveform display rectangle of pixels on which waveform display 504 is rendered as defined by graphical user interface 116. The "o" represents that this coordinate value is the origin of that rectangle.

US 6,320,577 B1  
Nov. 26, 2001

Abstract  
FIG. 13 is a diagram of a waveform display 504.

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FIG. 13 is a diagram of a waveform display 504. The diagram shows a waveform display 504 with a grid and a waveform. The waveform is a single cycle of a sine wave. The grid is composed of horizontal and vertical lines. The waveform is plotted on the grid. The display is labeled 504.

FIG. 13 is a diagram of a waveform display 504.



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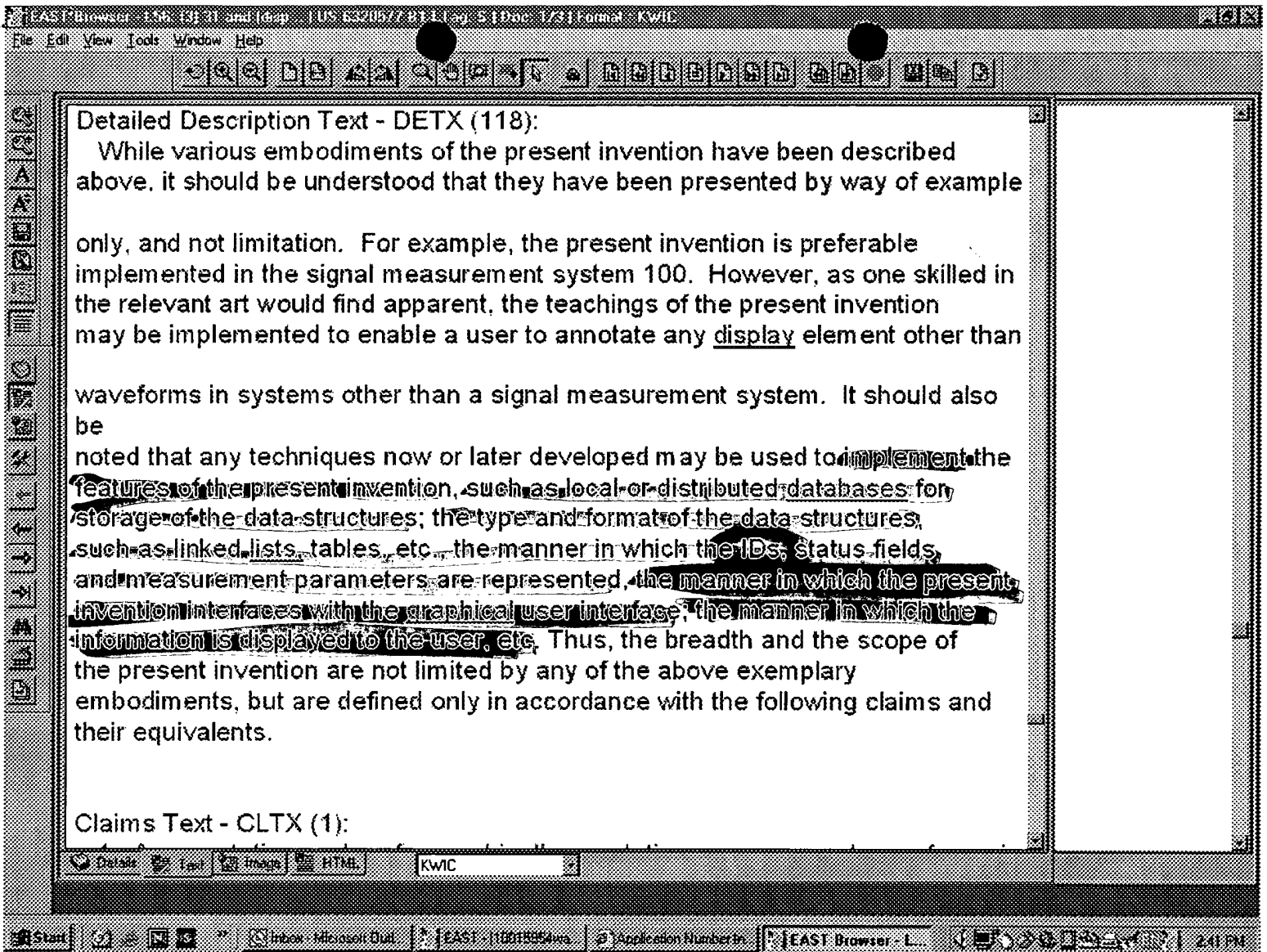
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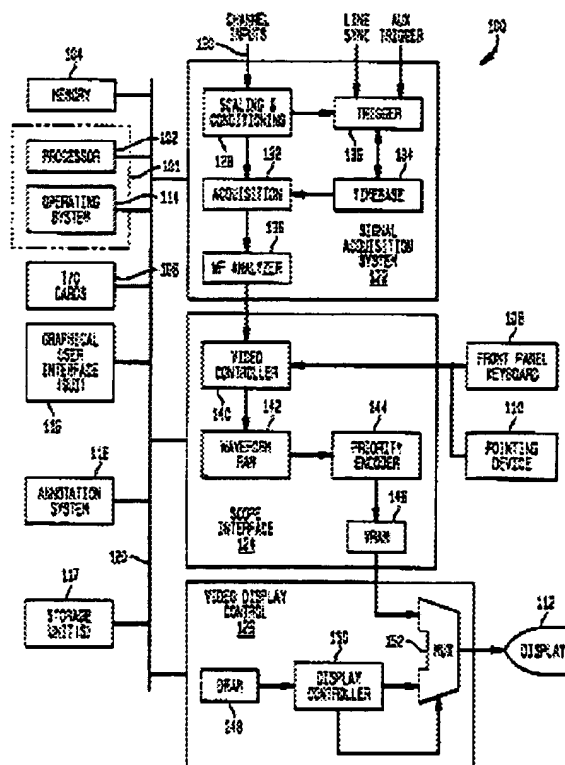
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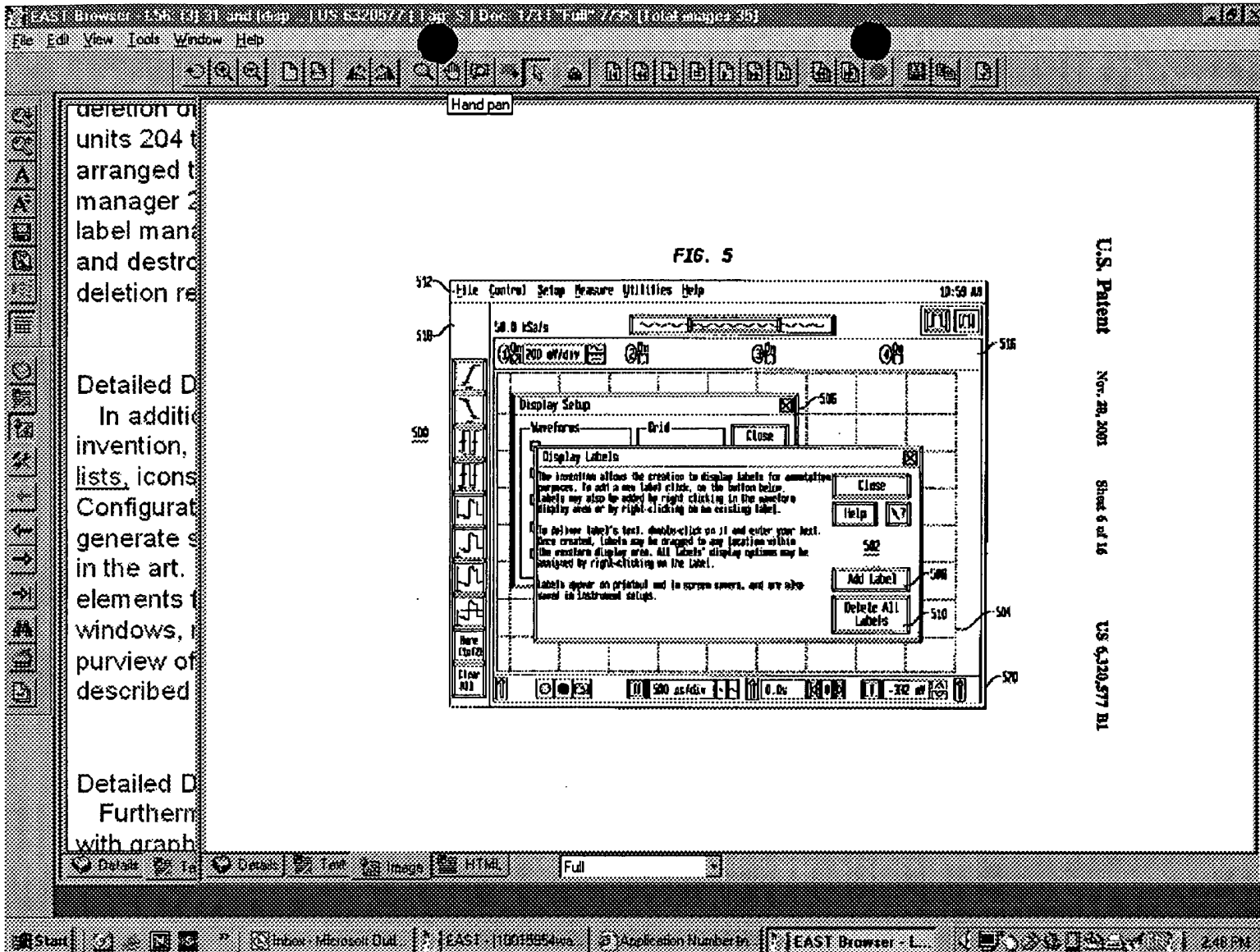
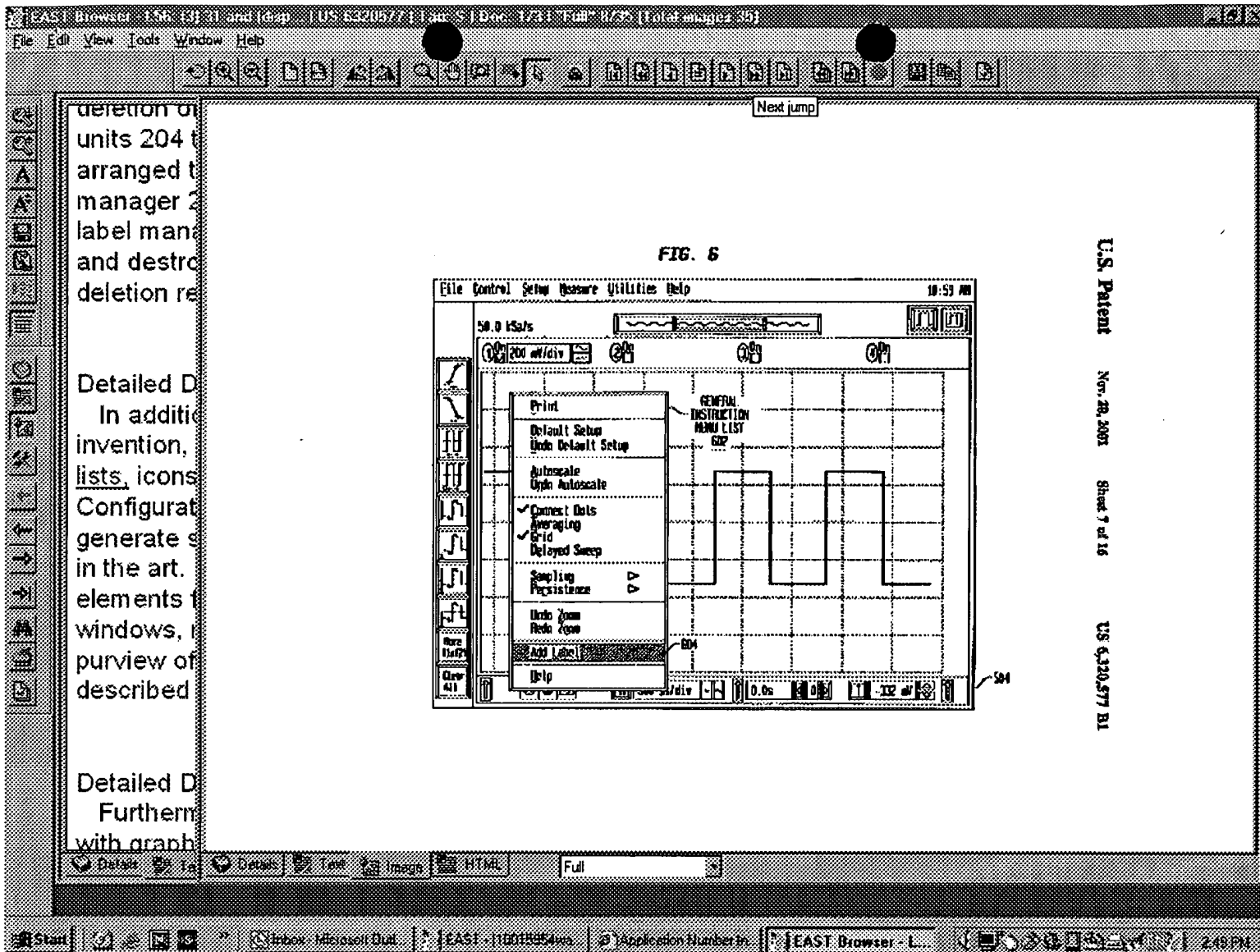


FIG. 5



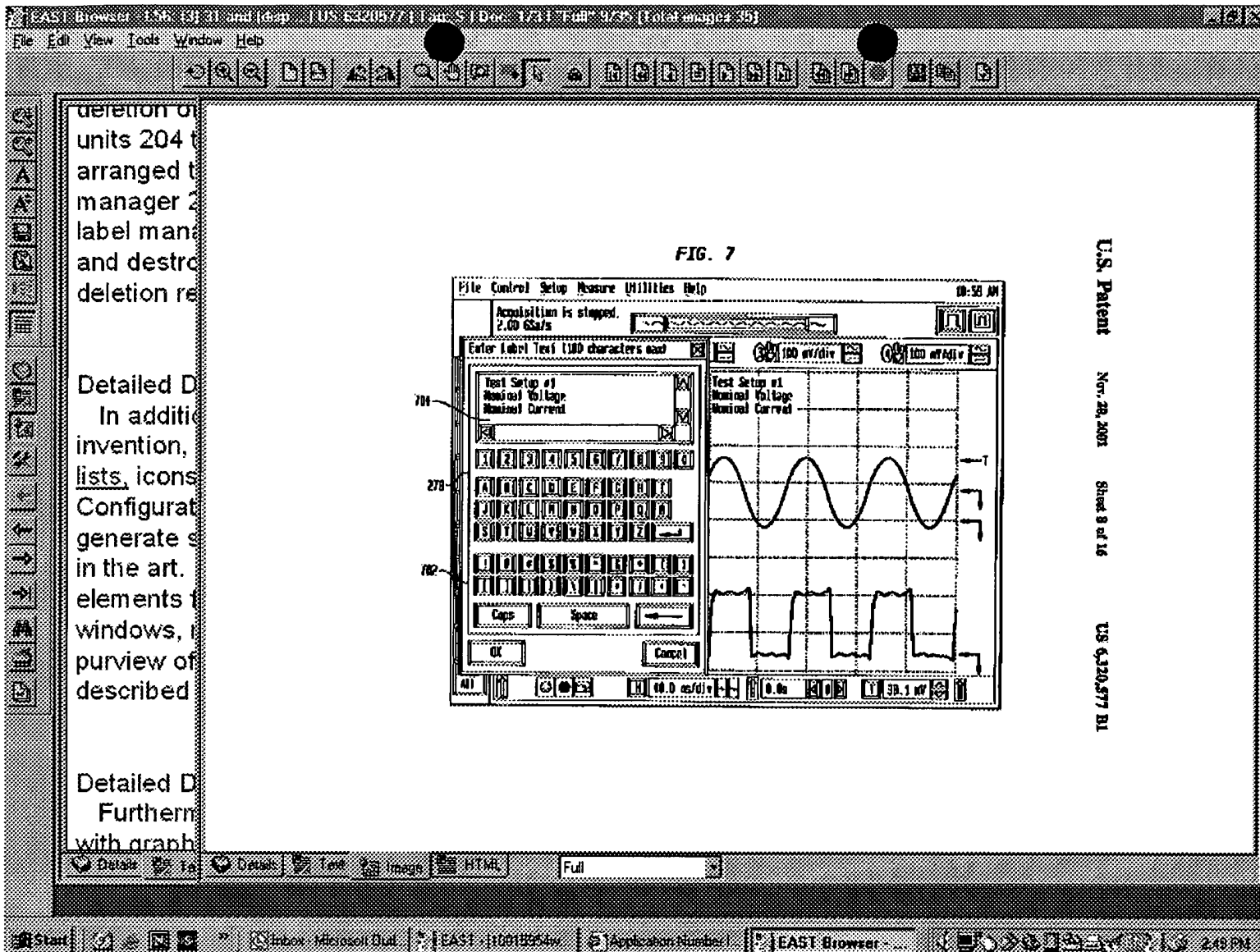
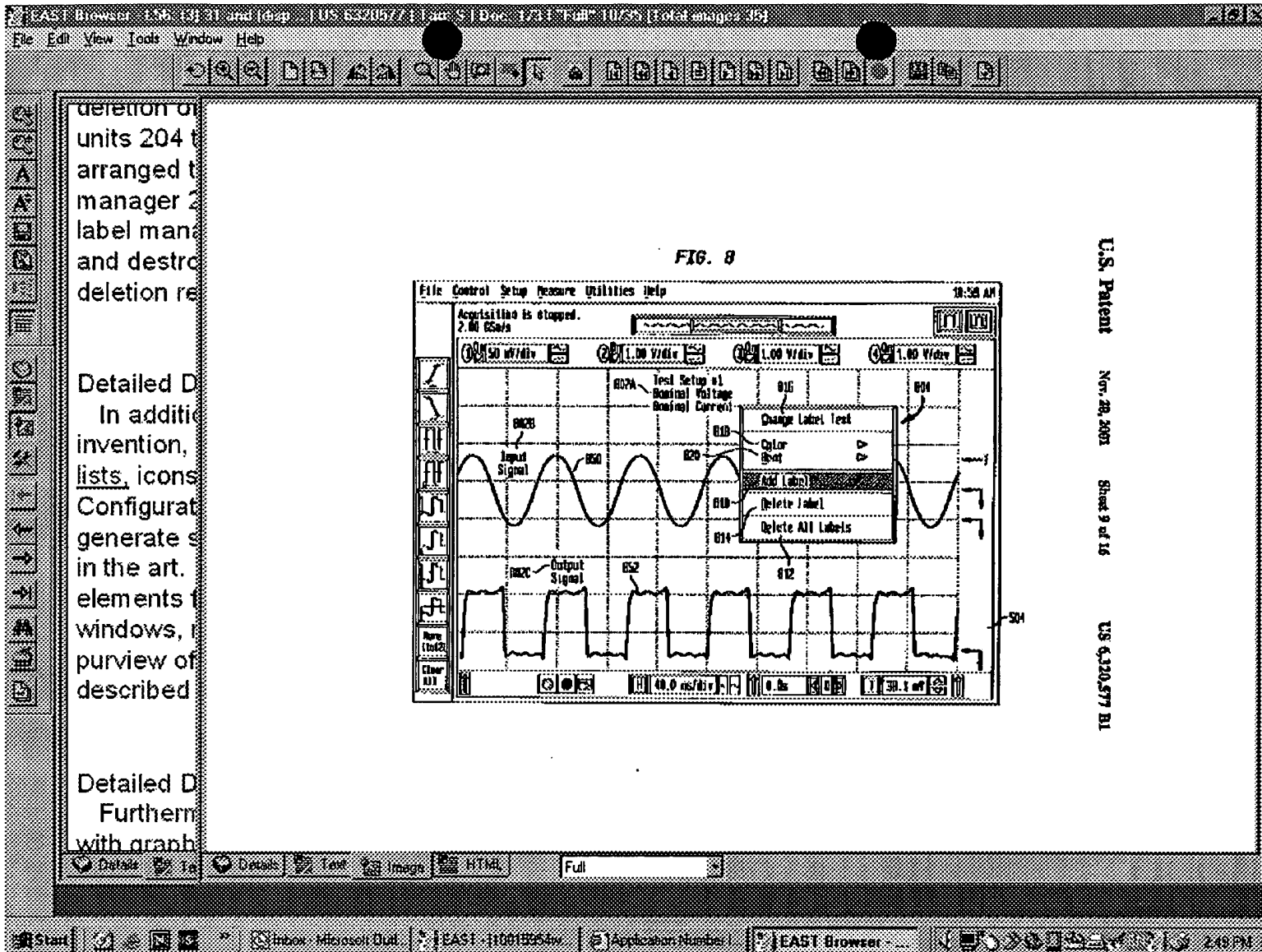


FIG. 7





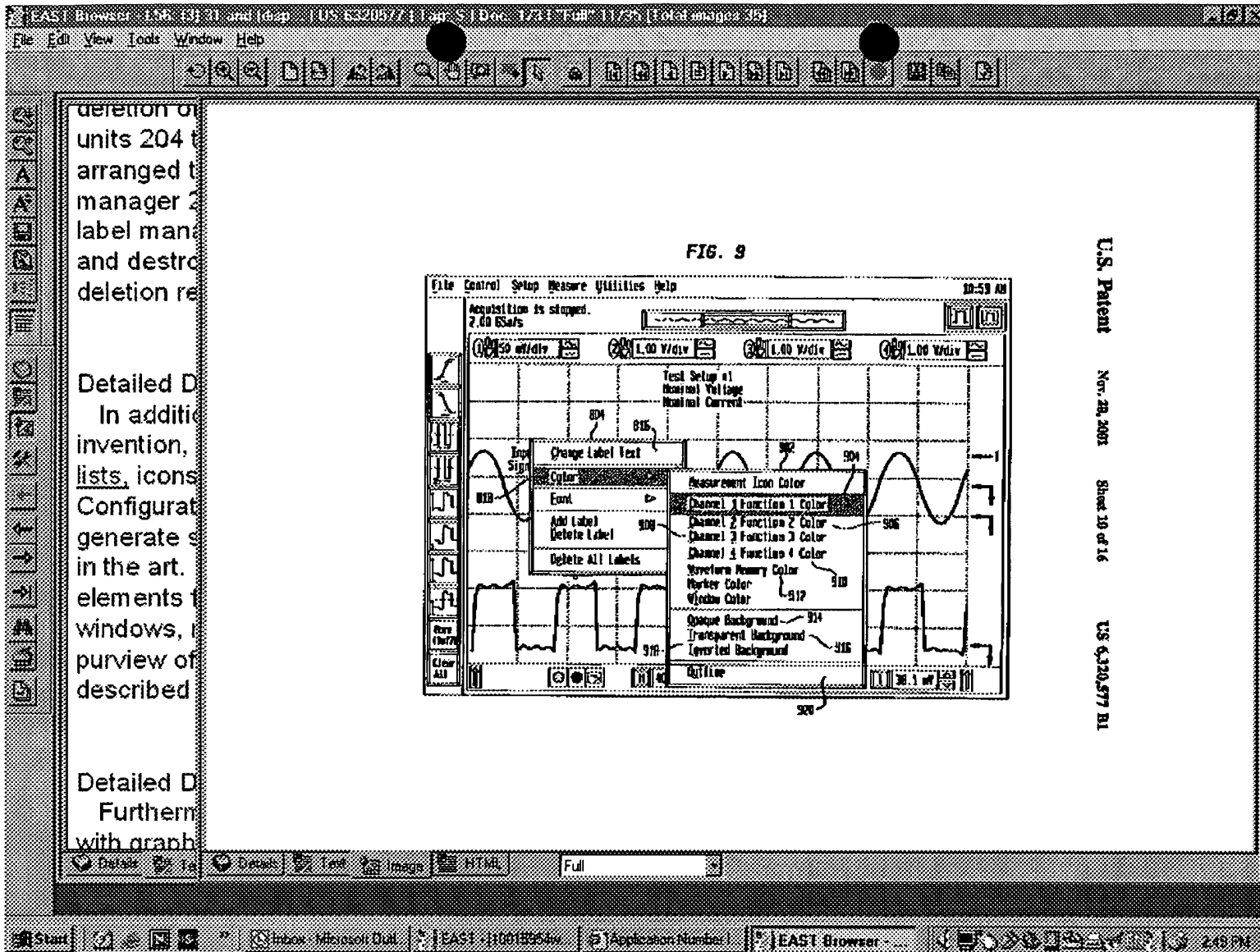


FIG. 9

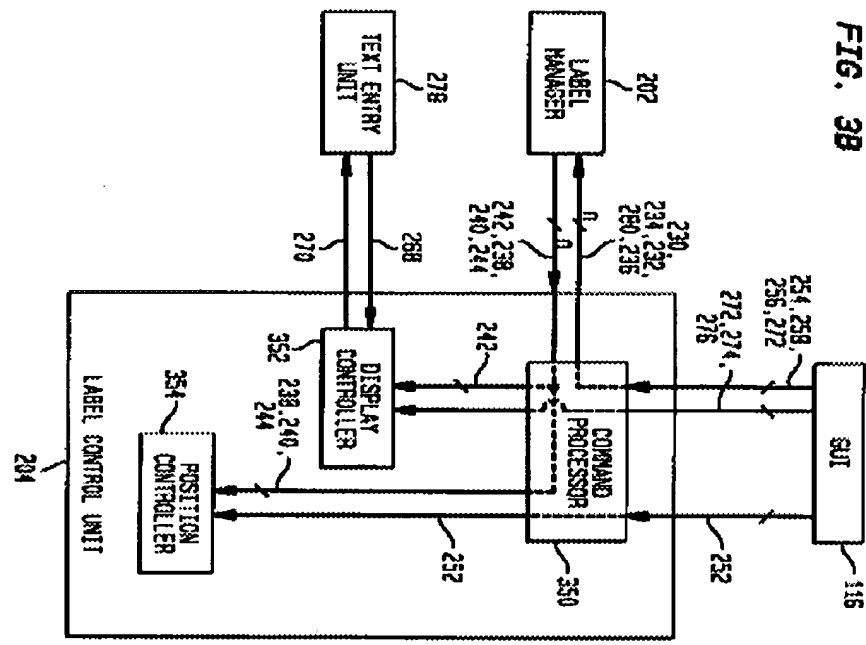


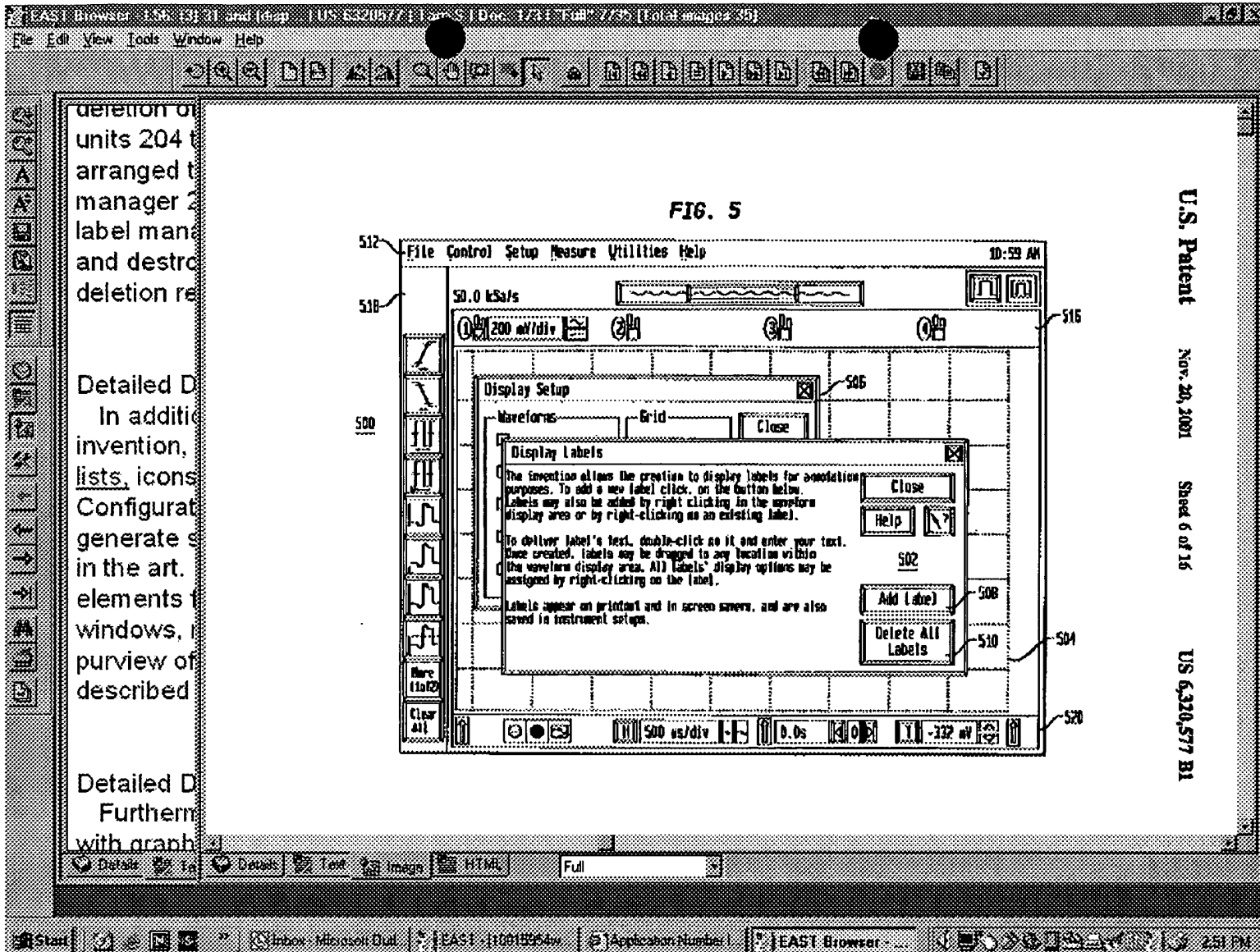
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FIG. 39



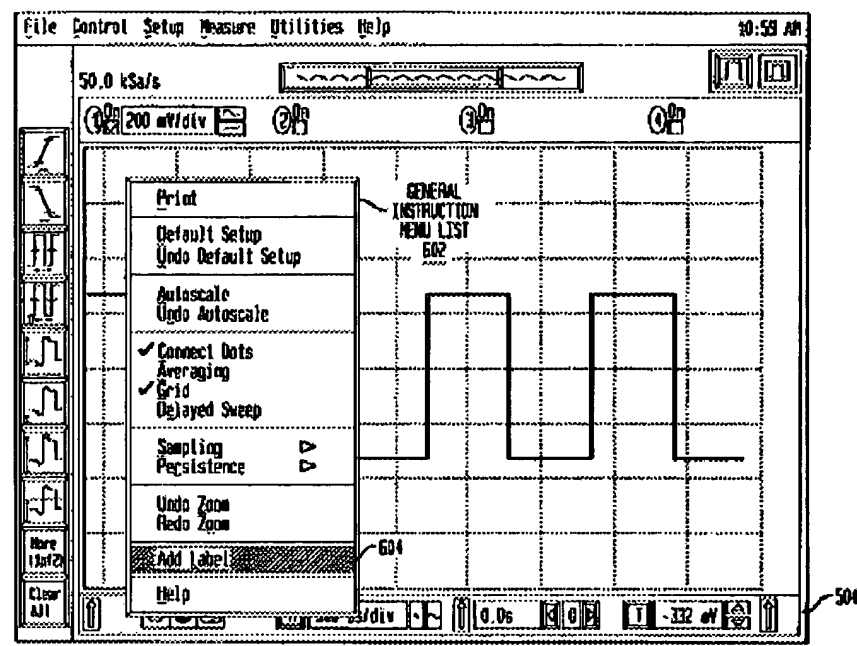


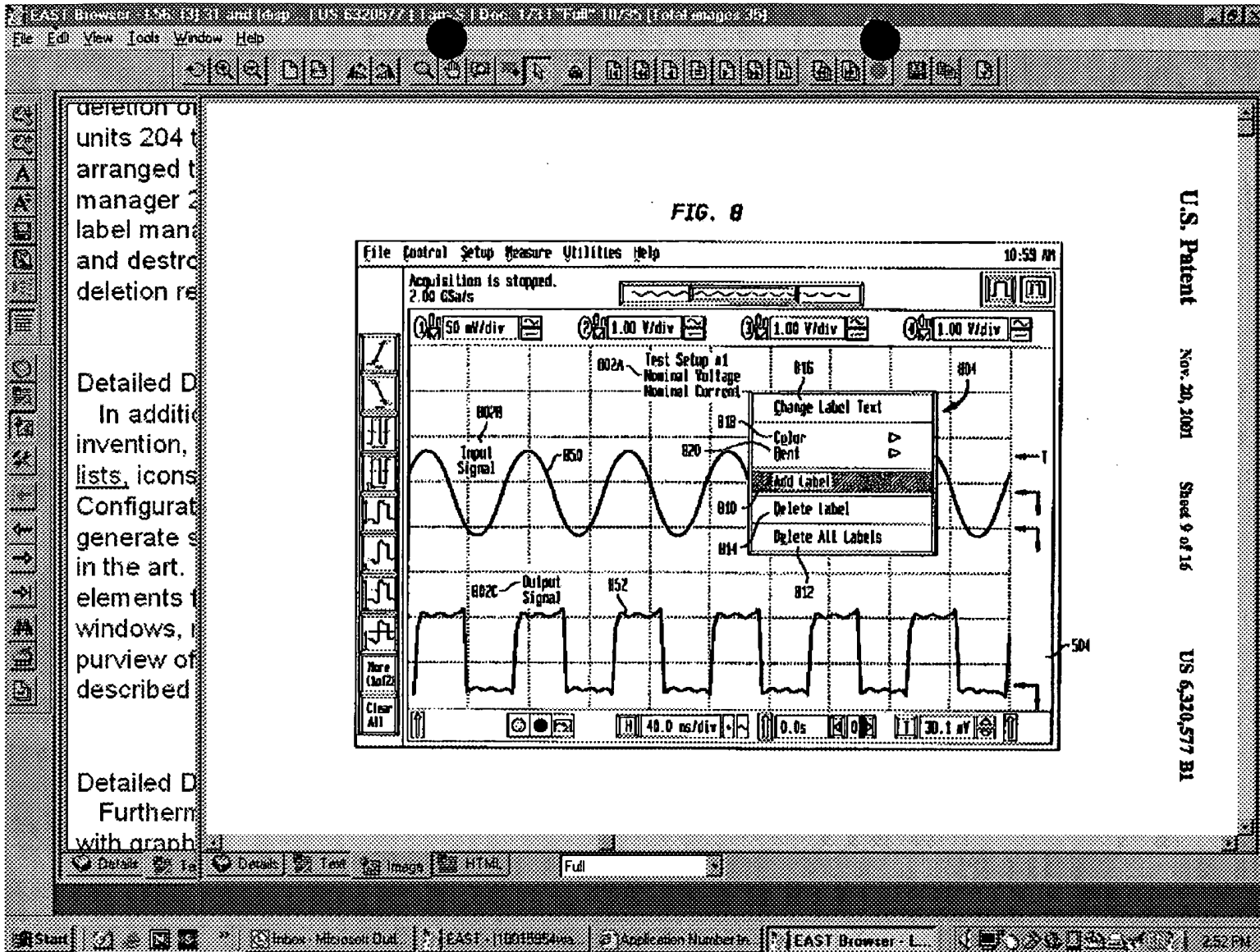
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FIG. 6









The screenshot displays a software interface for searching patent information. On the left, a list of search results is shown, each preceded by a magnifying glass icon and labeled from L45 to L56. Most entries are followed by the text "(display or visual\$S)".

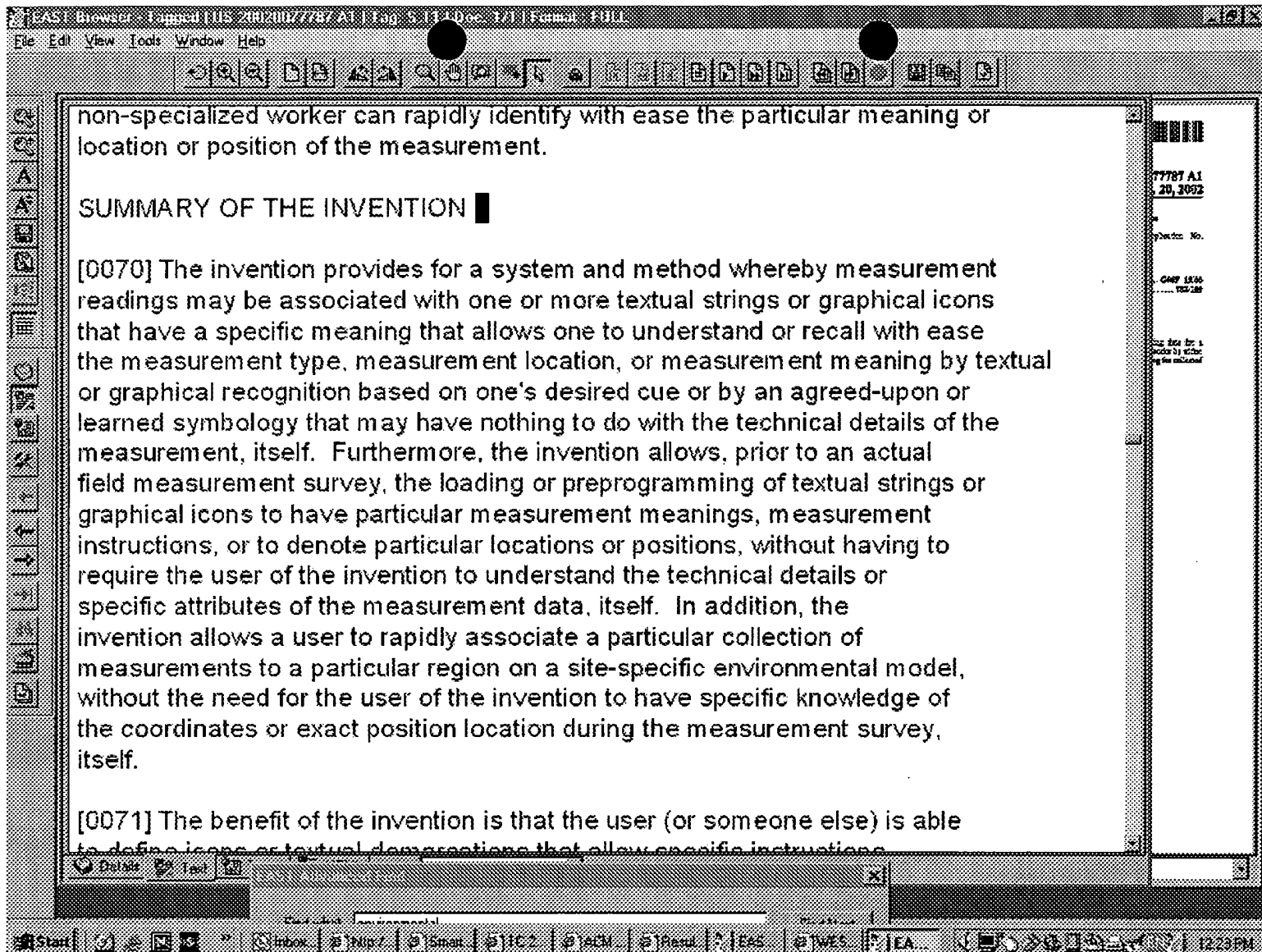
The main area on the right provides a detailed view of one of the search results. It includes a search bar at the top with buttons for "Search", "Browse", "Query", and "Clear". Below this, there's a section for "DBs" listing various databases like USPAT, USPGPUB, EPO, JPO, DERWENT, IBM, TDB, etc., with checkboxes for "Pulsis" and "Highlight all hit terms initially".

The central part of the right pane shows a complex Boolean search query: "31 and (display or visula\$8)same (database or file\$1 or memory near4 (flash or shar\$3)) and ( collect\$5 or analy\$5 or simulat\$5 or model\$4 or map\$4 or predict\$5)same (measur\$7 or metrics or quality or perform\$5 or error near4 rate)and file near4 configuration and (text\$5 or lists or files or graphic\$4 or object\$1)".

At the bottom of the right pane, there's a navigation bar with tabs for "Abstract", "Claims", "Images", "Text", and "HTML".

	ID	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef R
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6320577 B1	20011120	35	System and method for graphically annotating a	345/440.1	345/440; 345/835;
2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6306089 B1	20011023	24	Ultrasonic diagnostic imaging system with	600/437	128/916; 600/443
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6262728 B1	20010717	32	System and method for annotating a graphical user	345/440.1	345/764; 715/512

The taskbar at the very bottom shows several open applications, including "Inbox - Microsoft Outlook", "EAST - (10015954wa...", and "Application Number Inform...". The system clock indicates it is 1:02 PM.

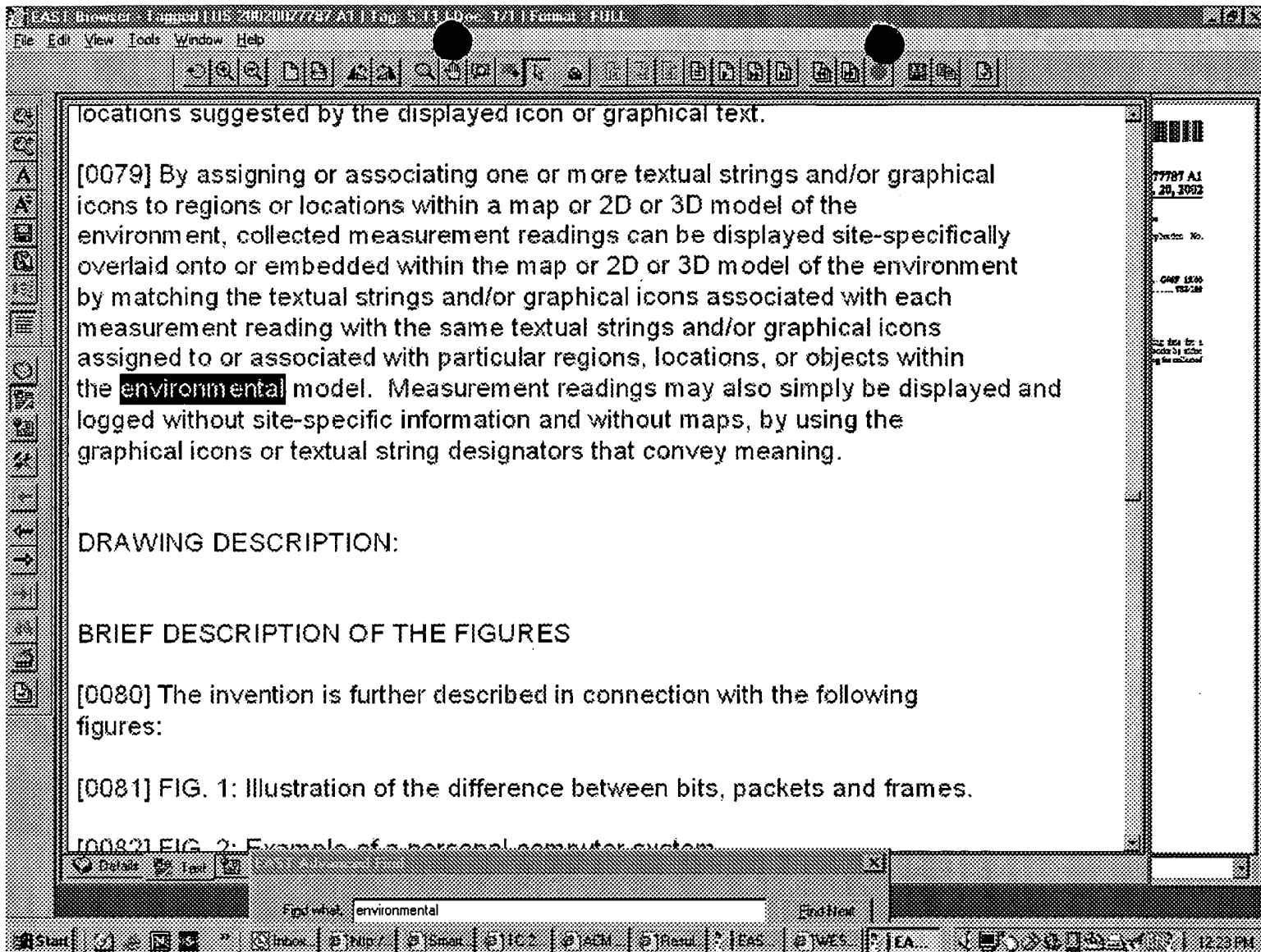


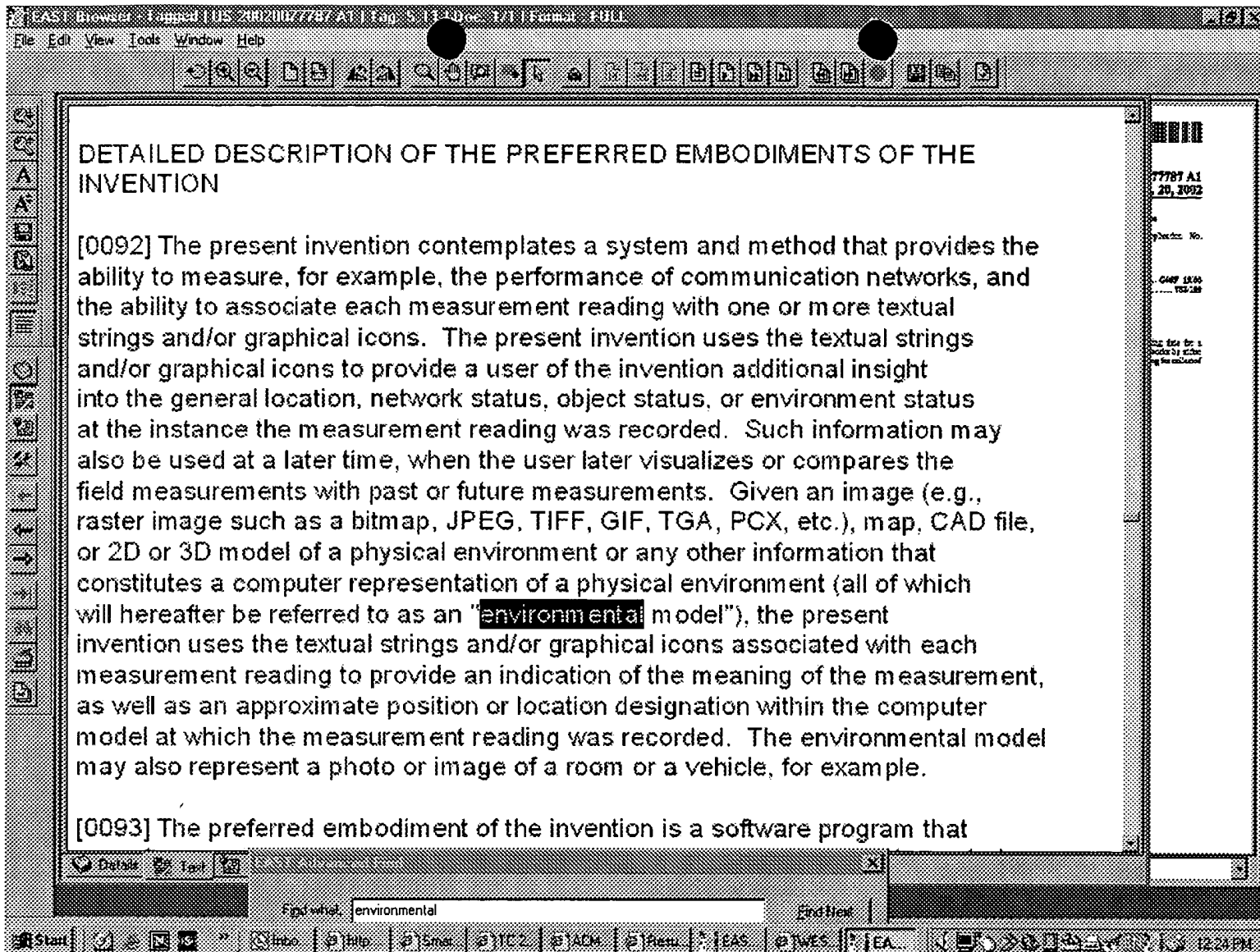
non-specialized worker can rapidly identify with ease the particular meaning or location or position of the measurement.

## SUMMARY OF THE INVENTION

[0070] The invention provides for a system and method whereby measurement readings may be associated with one or more textual strings or graphical icons that have a specific meaning that allows one to understand or recall with ease the measurement type, measurement location, or measurement meaning by textual or graphical recognition based on one's desired cue or by an agreed-upon or learned symbology that may have nothing to do with the technical details of the measurement, itself. Furthermore, the invention allows, prior to an actual field measurement survey, the loading or preprogramming of textual strings or graphical icons to have particular measurement meanings, measurement instructions, or to denote particular locations or positions, without having to require the user of the invention to understand the technical details or specific attributes of the measurement data, itself. In addition, the invention allows a user to rapidly associate a particular collection of measurements to a particular region on a site-specific environmental model, without the need for the user of the invention to have specific knowledge of the coordinates or exact position location during the measurement survey, itself.

[0071] The benefit of the invention is that the user (or someone else) is able to define icons or textual designations that allow specific instructions



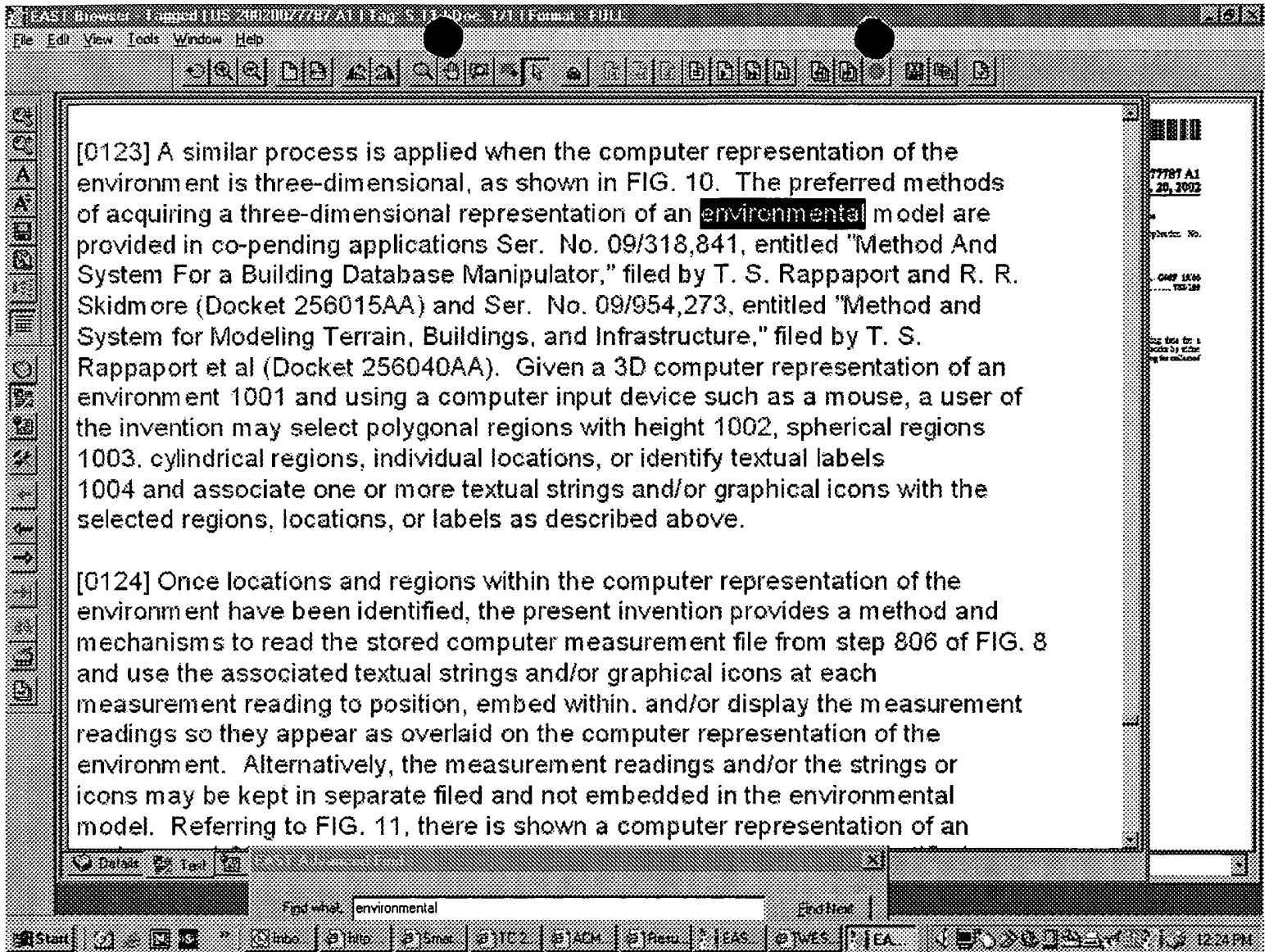


## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

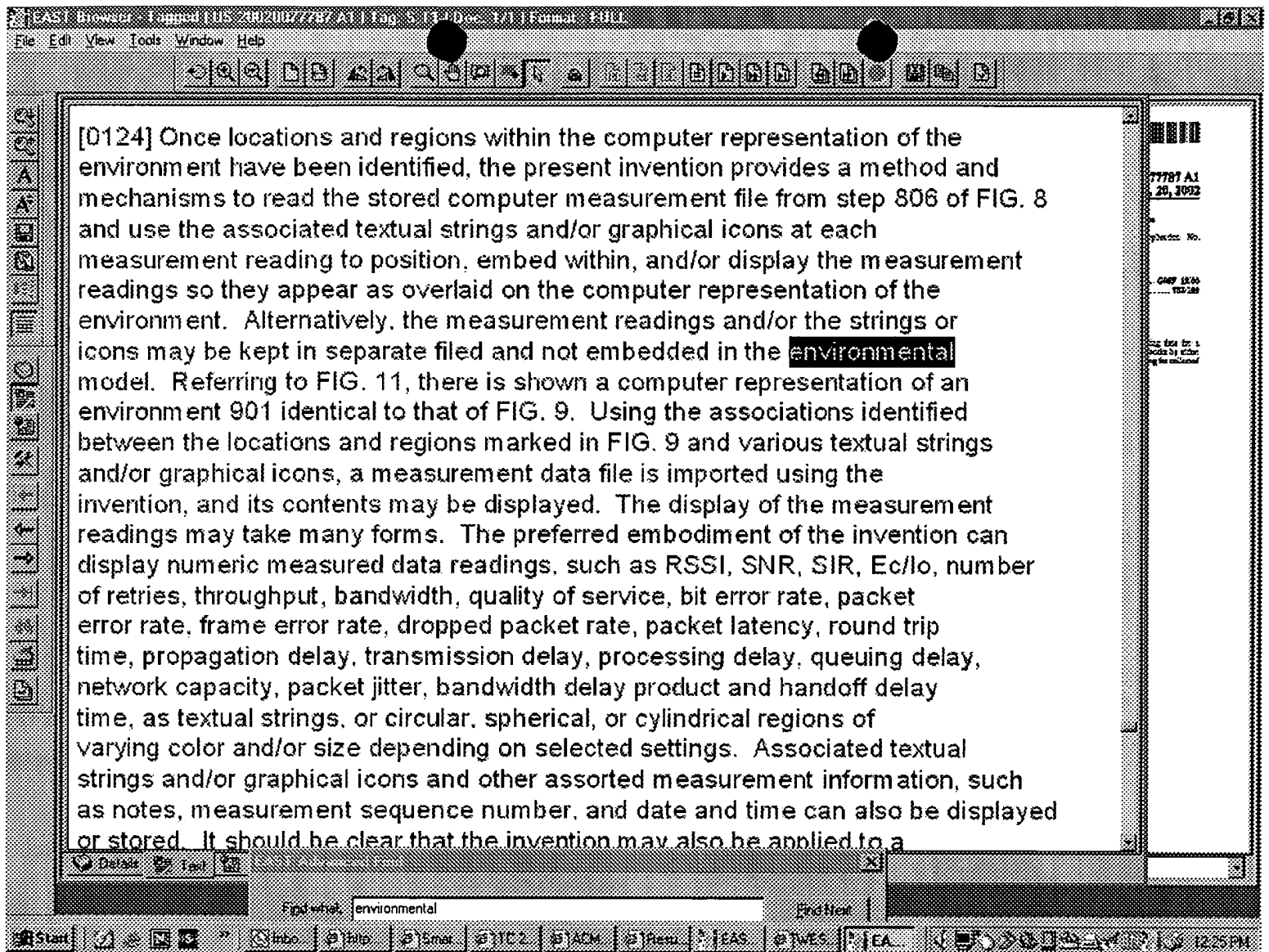
[0092] The present invention contemplates a system and method that provides the ability to measure, for example, the performance of communication networks, and the ability to associate each measurement reading with one or more textual strings and/or graphical icons. The present invention uses the textual strings and/or graphical icons to provide a user of the invention additional insight into the general location, network status, object status, or environment status at the instance the measurement reading was recorded. Such information may also be used at a later time, when the user later visualizes or compares the field measurements with past or future measurements. Given an image (e.g., raster image such as a bitmap, JPEG, TIFF, GIF, TGA, PCX, etc.), map, CAD file, or 2D or 3D model of a physical environment or any other information that constitutes a computer representation of a physical environment (all of which will hereafter be referred to as an "environmental model"), the present invention uses the textual strings and/or graphical icons associated with each measurement reading to provide an indication of the meaning of the measurement, as well as an approximate position or location designation within the computer model at which the measurement reading was recorded. The environmental model may also represent a photo or image of a room or a vehicle, for example.

[0093] The preferred embodiment of the invention is a software program that

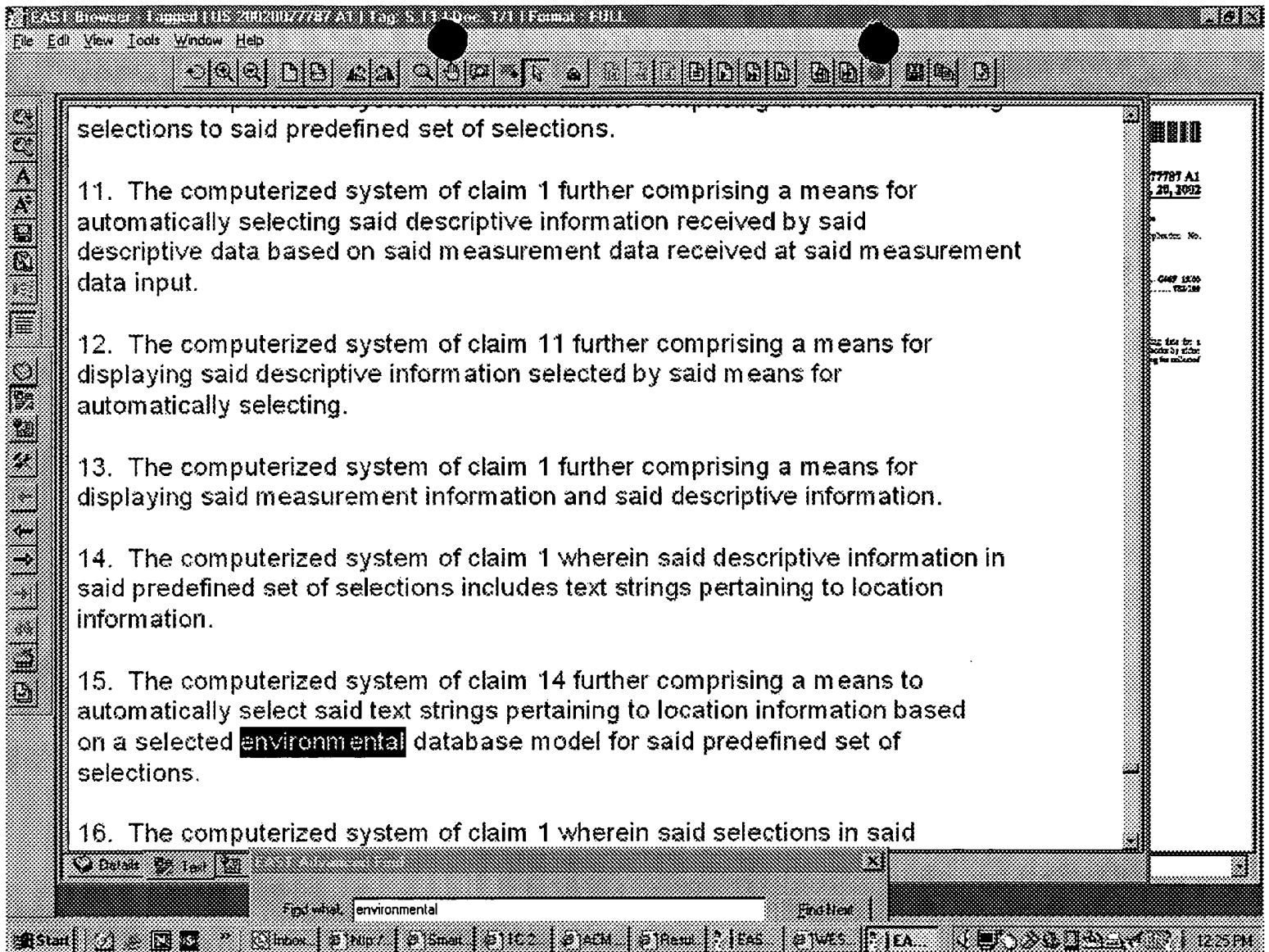


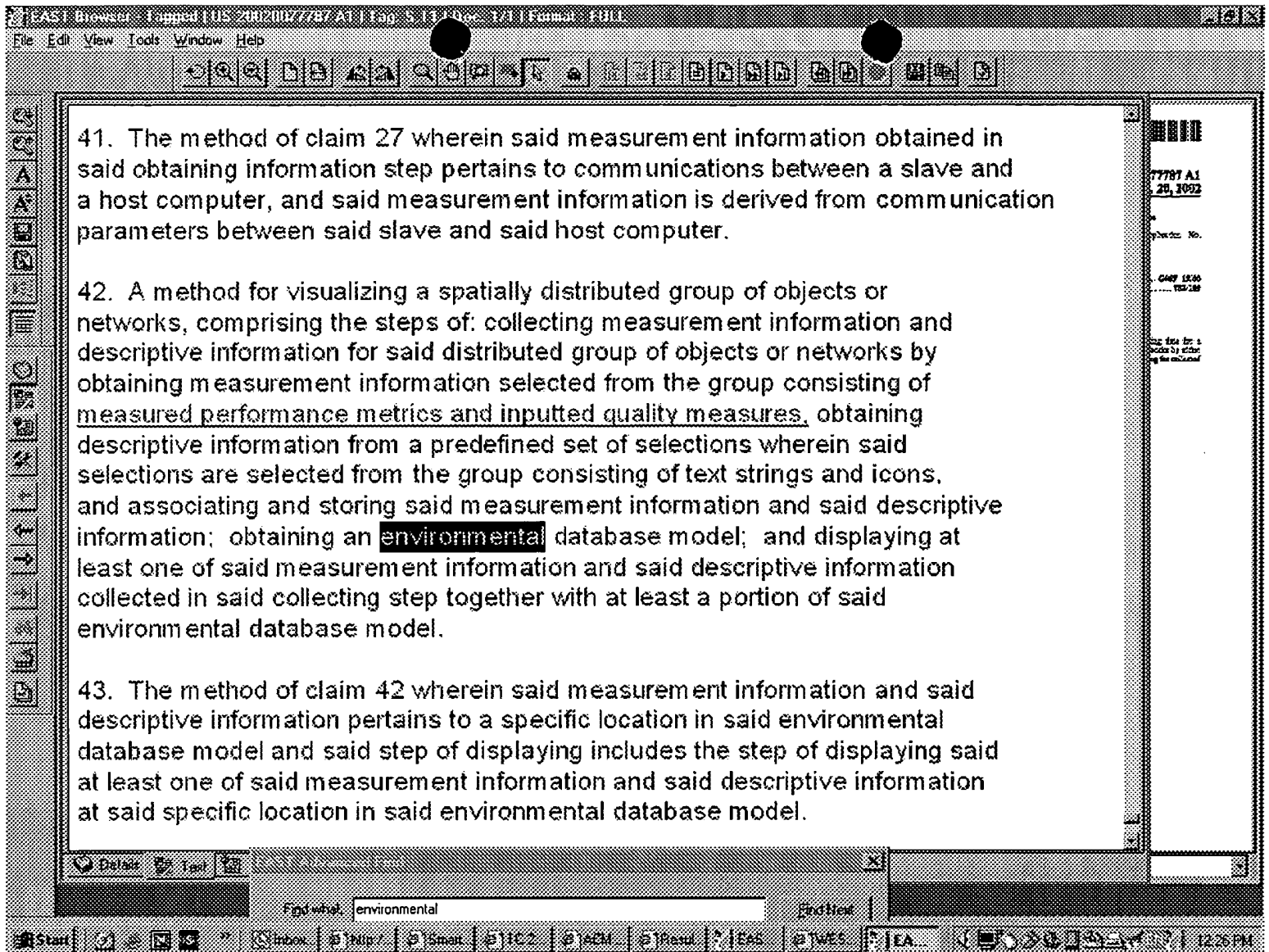


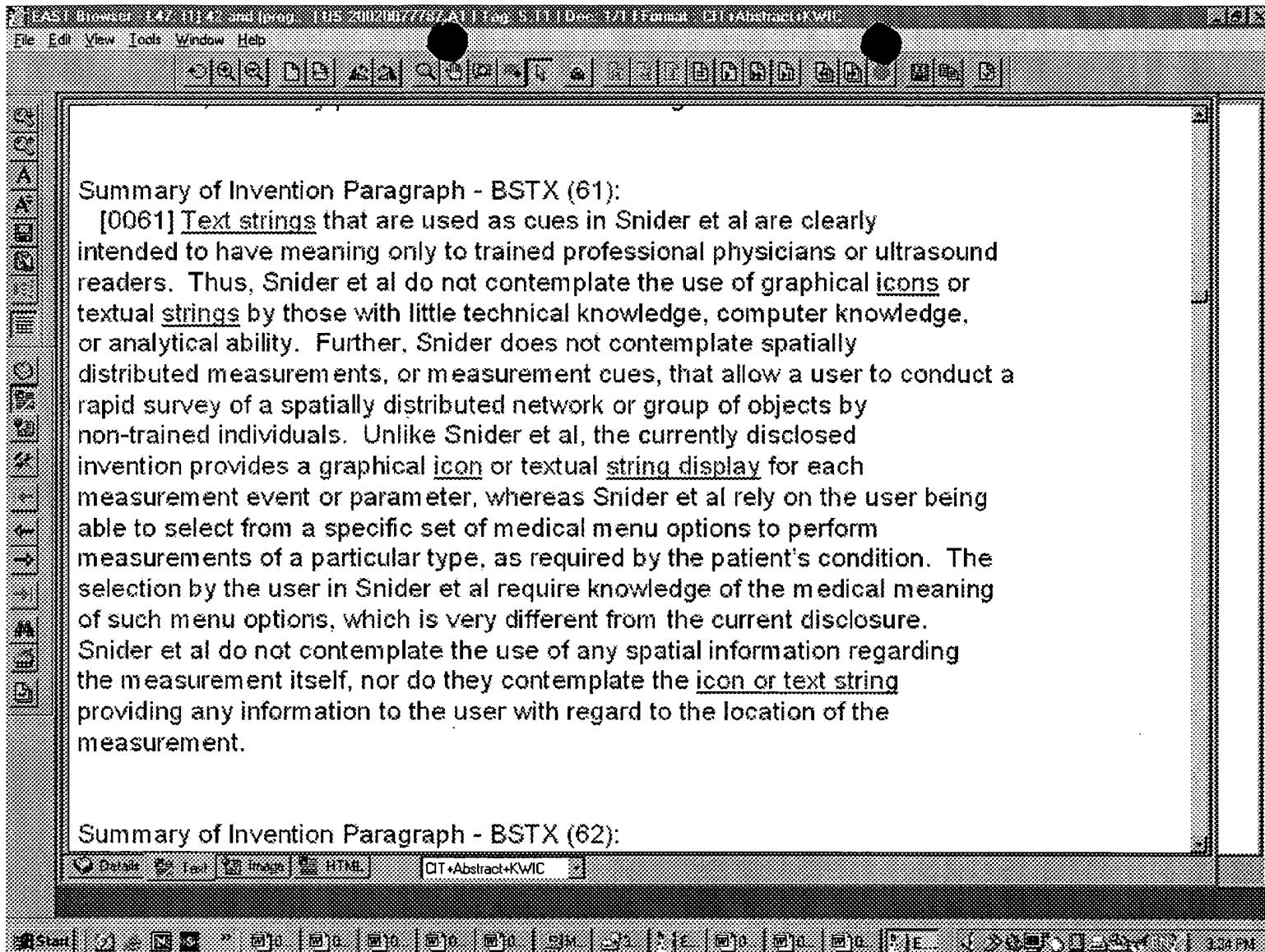








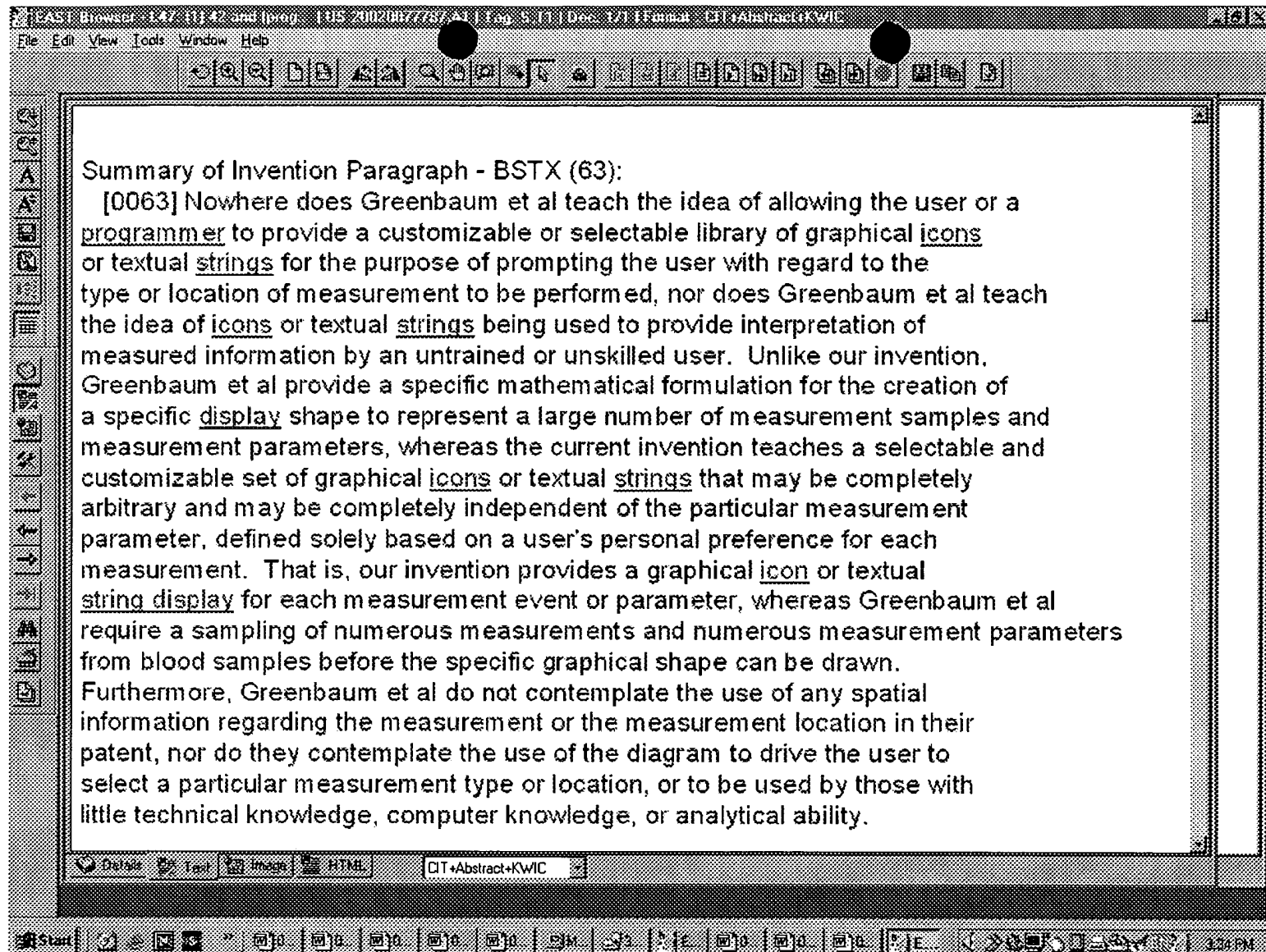




#### Summary of Invention Paragraph - BSTX (61):

[0061] Text strings that are used as cues in Snider et al are clearly intended to have meaning only to trained professional physicians or ultrasound readers. Thus, Snider et al do not contemplate the use of graphical icons or textual strings by those with little technical knowledge, computer knowledge, or analytical ability. Further, Snider does not contemplate spatially distributed measurements, or measurement cues, that allow a user to conduct a rapid survey of a spatially distributed network or group of objects by non-trained individuals. Unlike Snider et al, the currently disclosed invention provides a graphical icon or textual string display for each measurement event or parameter, whereas Snider et al rely on the user being able to select from a specific set of medical menu options to perform measurements of a particular type, as required by the patient's condition. The selection by the user in Snider et al require knowledge of the medical meaning of such menu options, which is very different from the current disclosure. Snider et al do not contemplate the use of any spatial information regarding the measurement itself, nor do they contemplate the icon or text string providing any information to the user with regard to the location of the measurement.

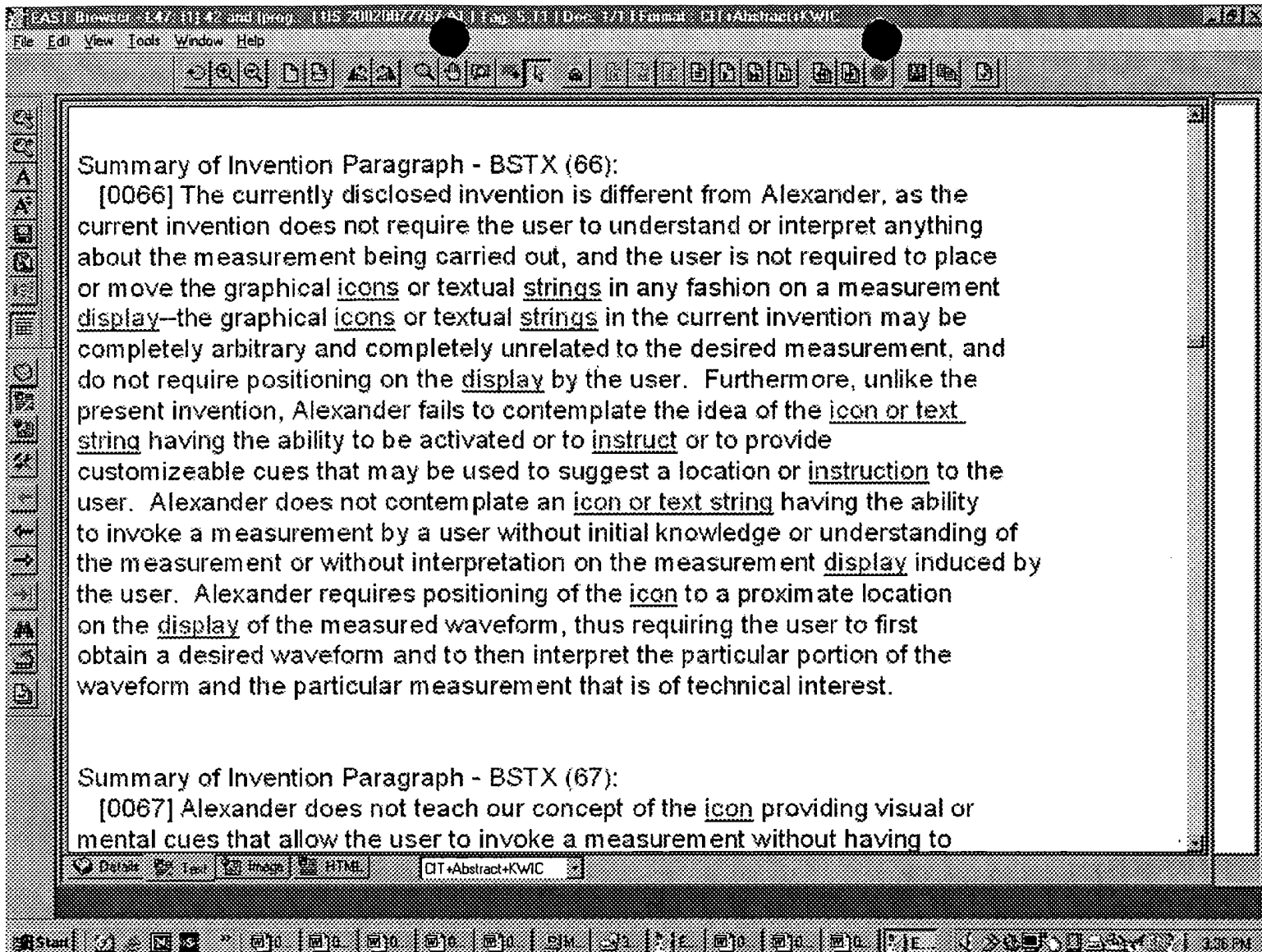
#### Summary of Invention Paragraph - BSTX (62):



#### Summary of Invention Paragraph - BSTX (63):

[0063] Nowhere does Greenbaum et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed, nor does Greenbaum et al teach the idea of icons or textual strings being used to provide interpretation of measured information by an untrained or unskilled user. Unlike our invention, Greenbaum et al provide a specific mathematical formulation for the creation of a specific display shape to represent a large number of measurement samples and measurement parameters, whereas the current invention teaches a selectable and customizable set of graphical icons or textual strings that may be completely arbitrary and may be completely independent of the particular measurement parameter, defined solely based on a user's personal preference for each measurement. That is, our invention provides a graphical icon or textual string display for each measurement event or parameter, whereas Greenbaum et al require a sampling of numerous measurements and numerous measurement parameters from blood samples before the specific graphical shape can be drawn. Furthermore, Greenbaum et al do not contemplate the use of any spatial information regarding the measurement or the measurement location in their patent, nor do they contemplate the use of the diagram to drive the user to select a particular measurement type or location, or to be used by those with little technical knowledge, computer knowledge, or analytical ability.

[illegible]



#### Summary of Invention Paragraph - BSTX (66):

[0066] The currently disclosed invention is different from Alexander, as the current invention does not require the user to understand or interpret anything about the measurement being carried out, and the user is not required to place or move the graphical icons or textual strings in any fashion on a measurement display—the graphical icons or textual strings in the current invention may be completely arbitrary and completely unrelated to the desired measurement, and do not require positioning on the display by the user. Furthermore, unlike the present invention, Alexander fails to contemplate the idea of the icon or text string having the ability to be activated or to instruct or to provide customizable cues that may be used to suggest a location or instruction to the user. Alexander does not contemplate an icon or text string having the ability to invoke a measurement by a user without initial knowledge or understanding of the measurement or without interpretation on the measurement display induced by the user. Alexander requires positioning of the icon to a proximate location on the display of the measured waveform, thus requiring the user to first obtain a desired waveform and to then interpret the particular portion of the waveform and the particular measurement that is of technical interest.

#### Summary of Invention Paragraph - BSTX (67):

[0067] Alexander does not teach our concept of the icon providing visual or mental cues that allow the user to invoke a measurement without having to



































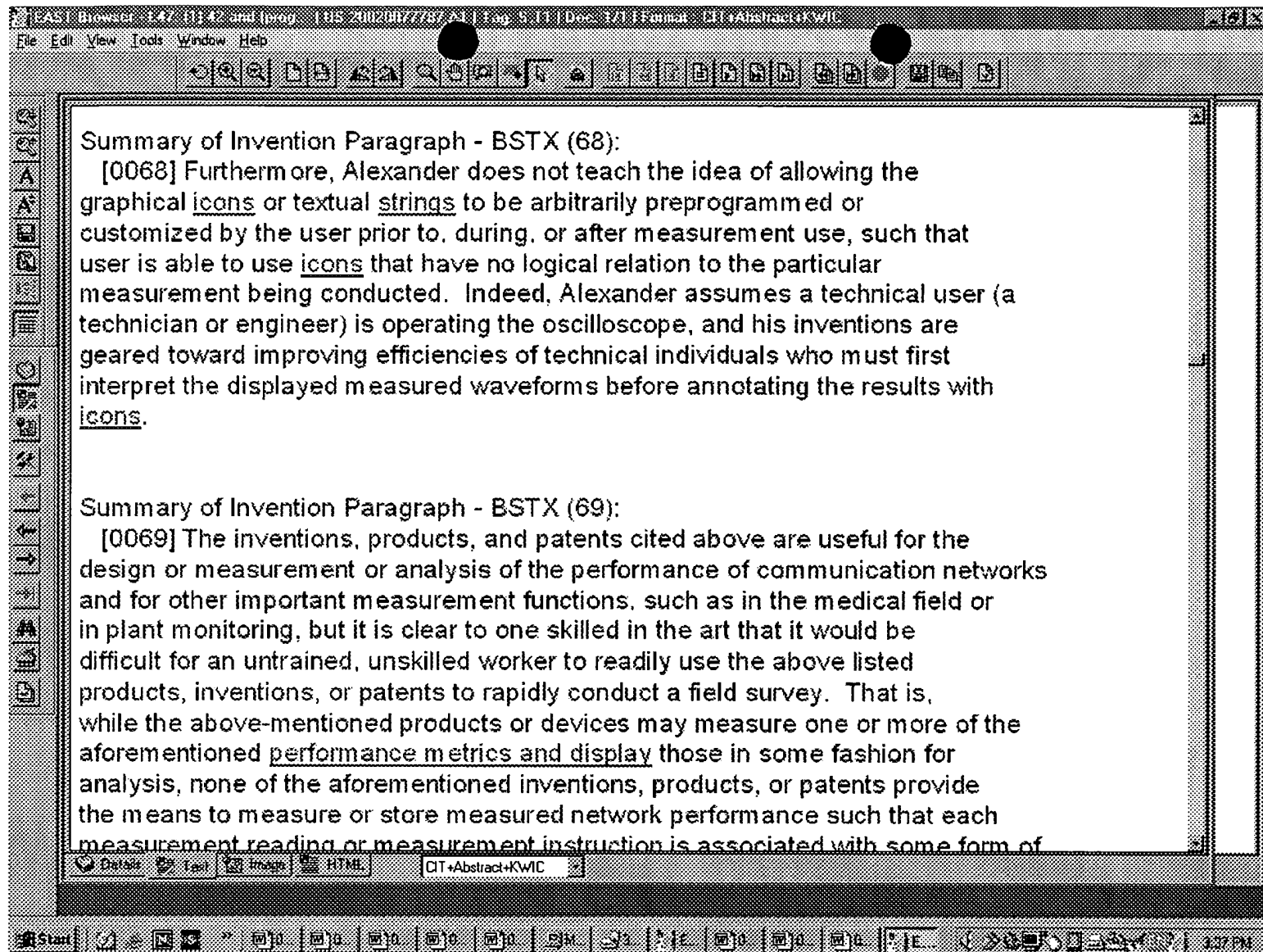


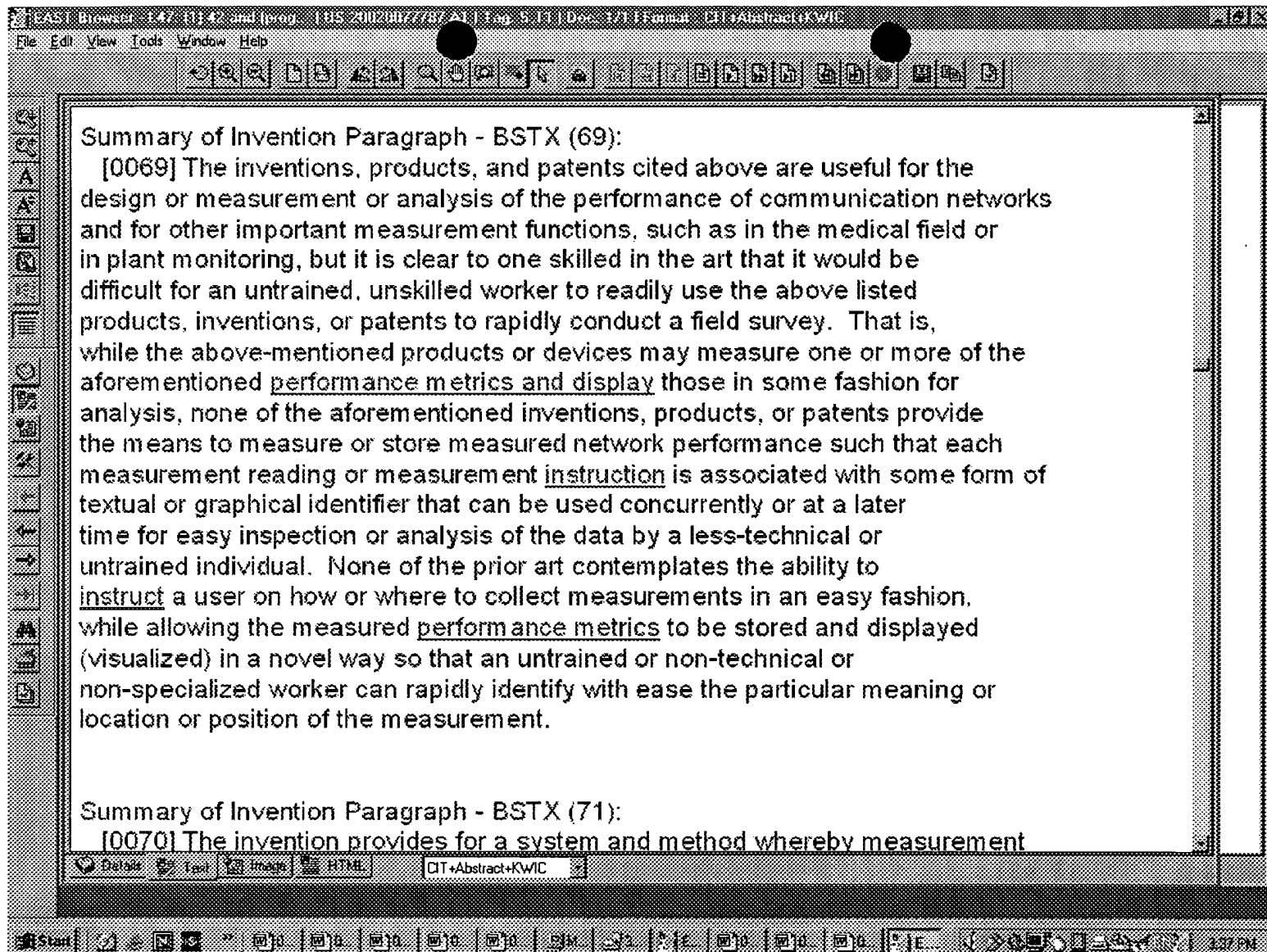








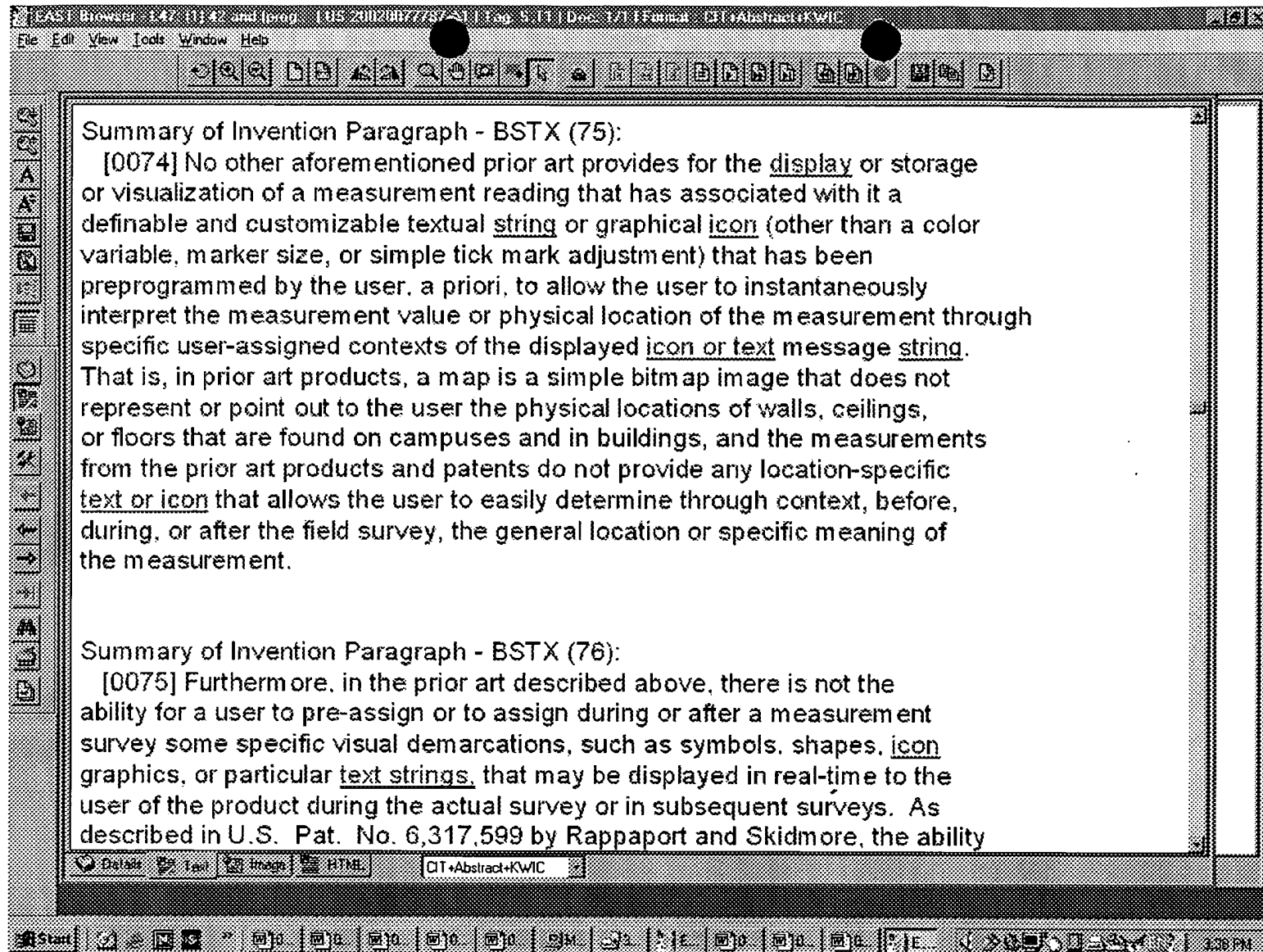


#### Summary of Invention Paragraph - BSTX (69):

[0069] The inventions, products, and patents cited above are useful for the design or measurement or analysis of the performance of communication networks and for other important measurement functions, such as in the medical field or in plant monitoring, but it is clear to one skilled in the art that it would be difficult for an untrained, unskilled worker to readily use the above listed products, inventions, or patents to rapidly conduct a field survey. That is, while the above-mentioned products or devices may measure one or more of the aforementioned performance metrics and display those in some fashion for analysis, none of the aforementioned inventions, products, or patents provide the means to measure or store measured network performance such that each measurement reading or measurement instruction is associated with some form of textual or graphical identifier that can be used concurrently or at a later time for easy inspection or analysis of the data by a less-technical or untrained individual. None of the prior art contemplates the ability to instruct a user on how or where to collect measurements in an easy fashion, while allowing the measured performance metrics to be stored and displayed (visualized) in a novel way so that an untrained or non-technical or non-specialized worker can rapidly identify with ease the particular meaning or location or position of the measurement.

#### Summary of Invention Paragraph - BSTX (71):

[0070] The invention provides for a system and method whereby measurement

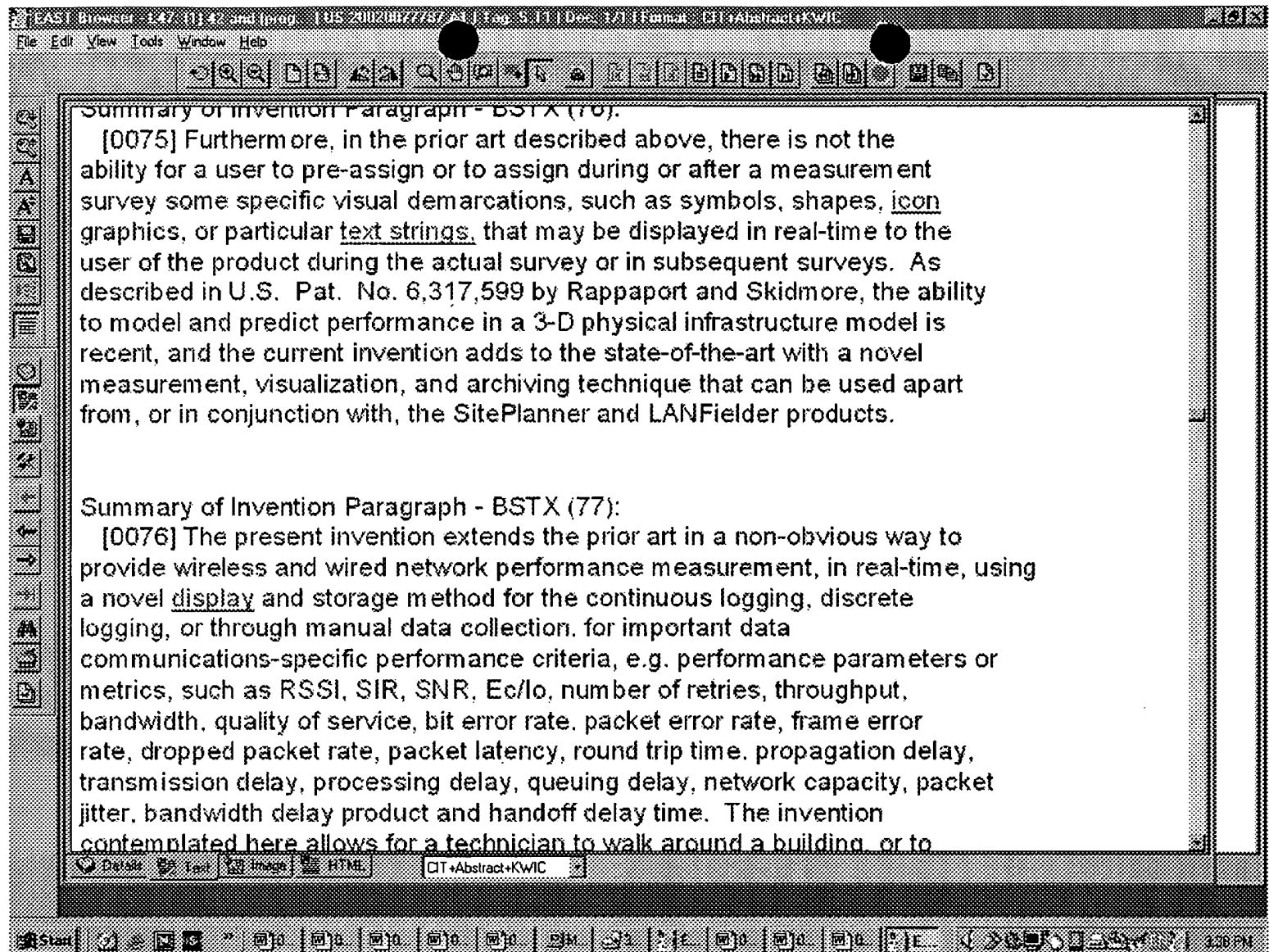


#### Summary of Invention Paragraph - BSTX (75):

[0074] No other aforementioned prior art provides for the display or storage or visualization of a measurement reading that has associated with it a definable and customizable textual string or graphical icon (other than a color variable, marker size, or simple tick mark adjustment) that has been preprogrammed by the user, a priori, to allow the user to instantaneously interpret the measurement value or physical location of the measurement through specific user-assigned contexts of the displayed icon or text message string. That is, in prior art products, a map is a simple bitmap image that does not represent or point out to the user the physical locations of walls, ceilings, or floors that are found on campuses and in buildings, and the measurements from the prior art products and patents do not provide any location-specific text or icon that allows the user to easily determine through context, before, during, or after the field survey, the general location or specific meaning of the measurement.

#### Summary of Invention Paragraph - BSTX (76):

[0075] Furthermore, in the prior art described above, there is not the ability for a user to pre-assign or to assign during or after a measurement survey some specific visual demarcations, such as symbols, shapes, icon graphics, or particular text strings, that may be displayed in real-time to the user of the product during the actual survey or in subsequent surveys. As described in U.S. Pat. No. 6,317,599 by Rappaport and Skidmore, the ability

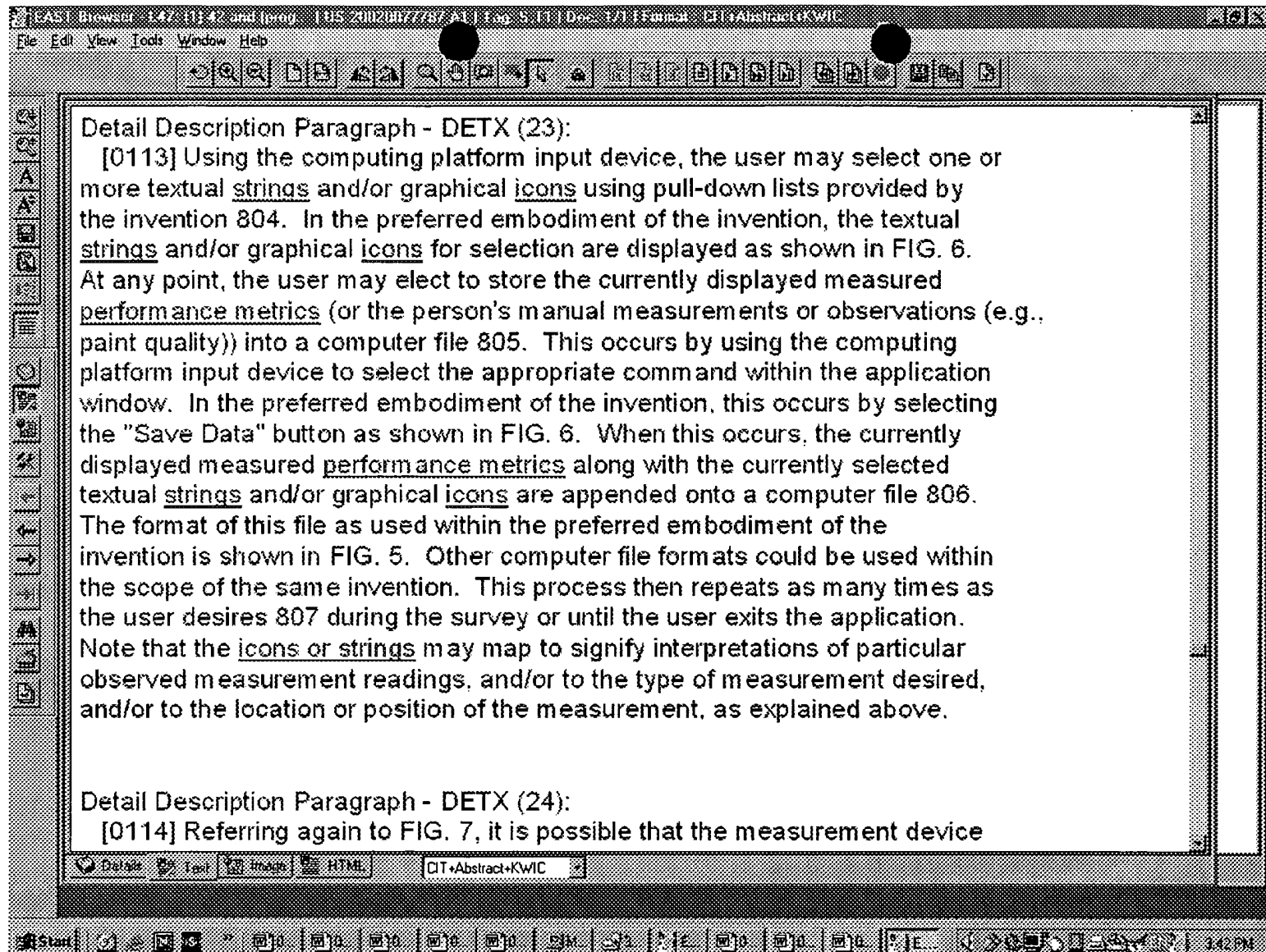


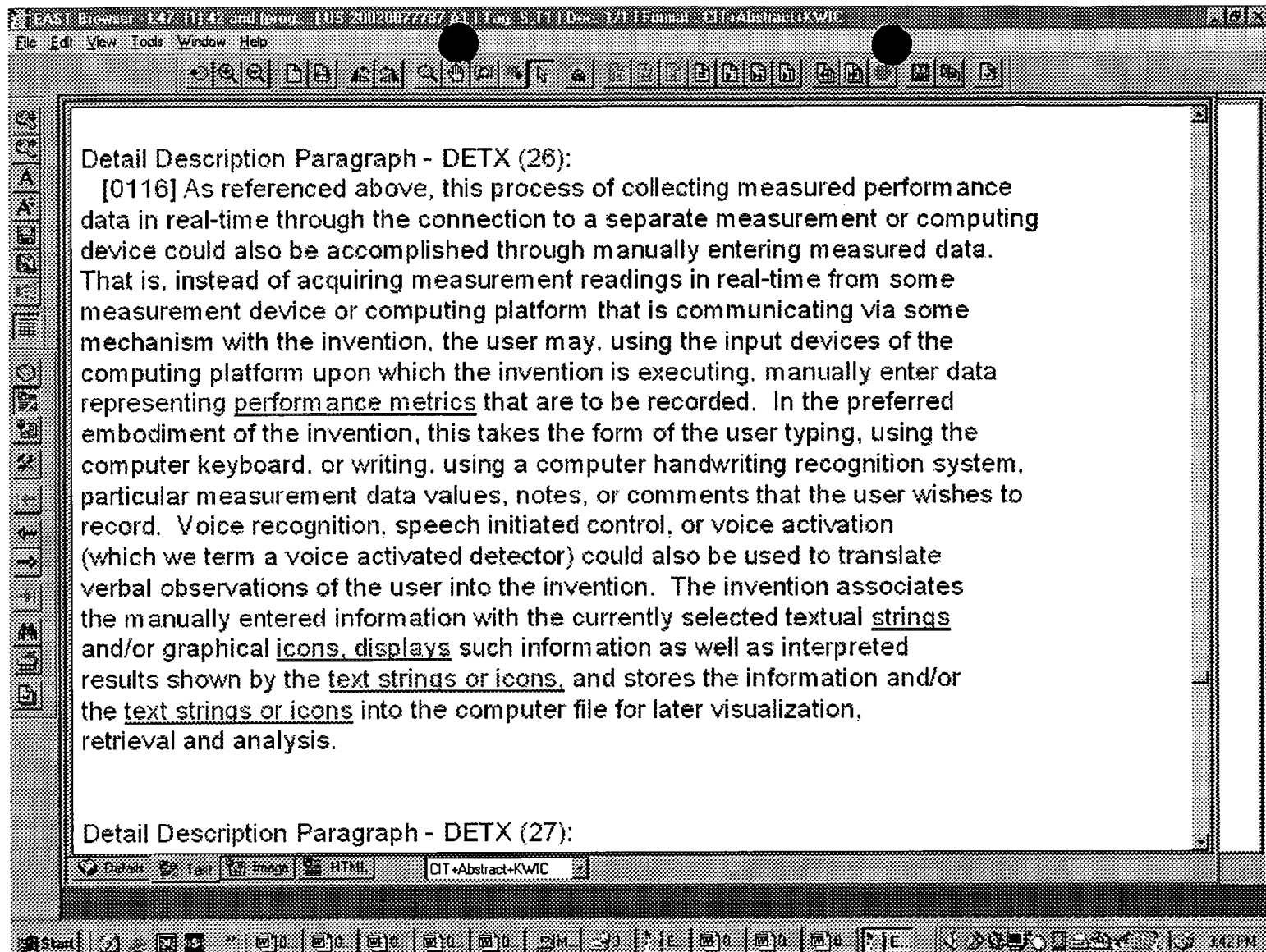
Summary of Invention Paragraph - BSTX (76):

[0075] Furthermore, in the prior art described above, there is not the ability for a user to pre-assign or to assign during or after a measurement survey some specific visual demarcations, such as symbols, shapes, icon graphics, or particular text strings, that may be displayed in real-time to the user of the product during the actual survey or in subsequent surveys. As described in U.S. Pat. No. 6,317,599 by Rappaport and Skidmore, the ability to model and predict performance in a 3-D physical infrastructure model is recent, and the current invention adds to the state-of-the-art with a novel measurement, visualization, and archiving technique that can be used apart from, or in conjunction with, the SitePlanner and LANFielder products.

Summary of Invention Paragraph - BSTX (77):

[0076] The present invention extends the prior art in a non-obvious way to provide wireless and wired network performance measurement, in real-time, using a novel display and storage method for the continuous logging, discrete logging, or through manual data collection, for important data communications-specific performance criteria, e.g. performance parameters or metrics, such as RSSI, SIR, SNR, Ec/Io, number of retries, throughput, bandwidth, quality of service, bit error rate, packet error rate, frame error rate, dropped packet rate, packet latency, round trip time, propagation delay, transmission delay, processing delay, queuing delay, network capacity, packet jitter, bandwidth delay product and handoff delay time. The invention contemplated here allows for a technician to walk around a building, or to





Detail Description Paragraph - DETX (26):

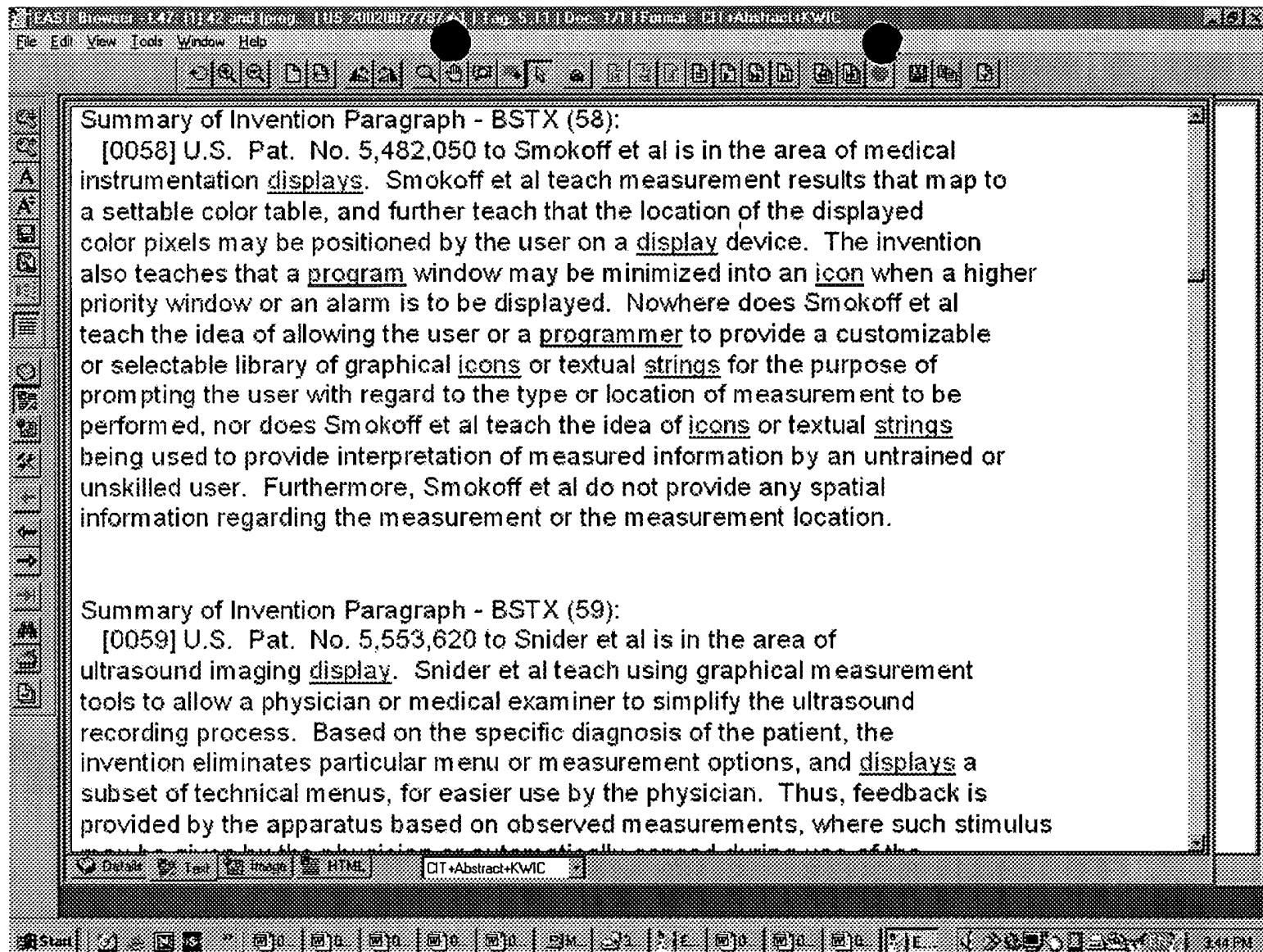
[0116] As referenced above, this process of collecting measured performance data in real-time through the connection to a separate measurement or computing device could also be accomplished through manually entering measured data. That is, instead of acquiring measurement readings in real-time from some measurement device or computing platform that is communicating via some mechanism with the invention, the user may, using the input devices of the computing platform upon which the invention is executing, manually enter data representing performance metrics that are to be recorded. In the preferred embodiment of the invention, this takes the form of the user typing, using the computer keyboard, or writing, using a computer handwriting recognition system, particular measurement data values, notes, or comments that the user wishes to record. Voice recognition, speech initiated control, or voice activation (which we term a voice activated detector) could also be used to translate verbal observations of the user into the invention. The invention associates the manually entered information with the currently selected textual strings and/or graphical icons, displays such information as well as interpreted results shown by the text strings or icons, and stores the information and/or the text strings or icons into the computer file for later visualization, retrieval and analysis.

Detail Description Paragraph - DETX (27):

[0120] Referring to FIG. 9, there is shown a floor plan of a building 901.

Detail Description Paragraph - DETX (31):



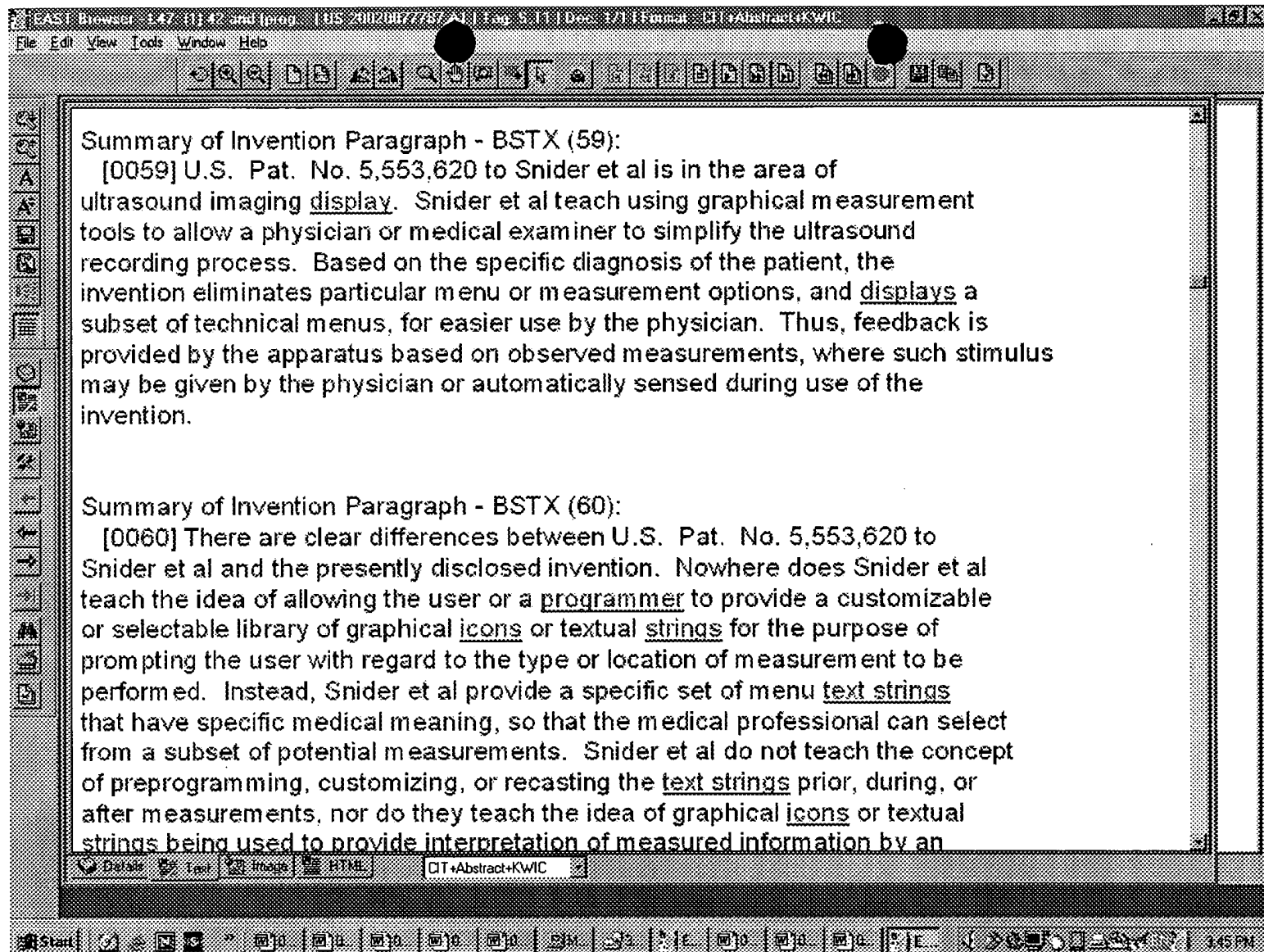


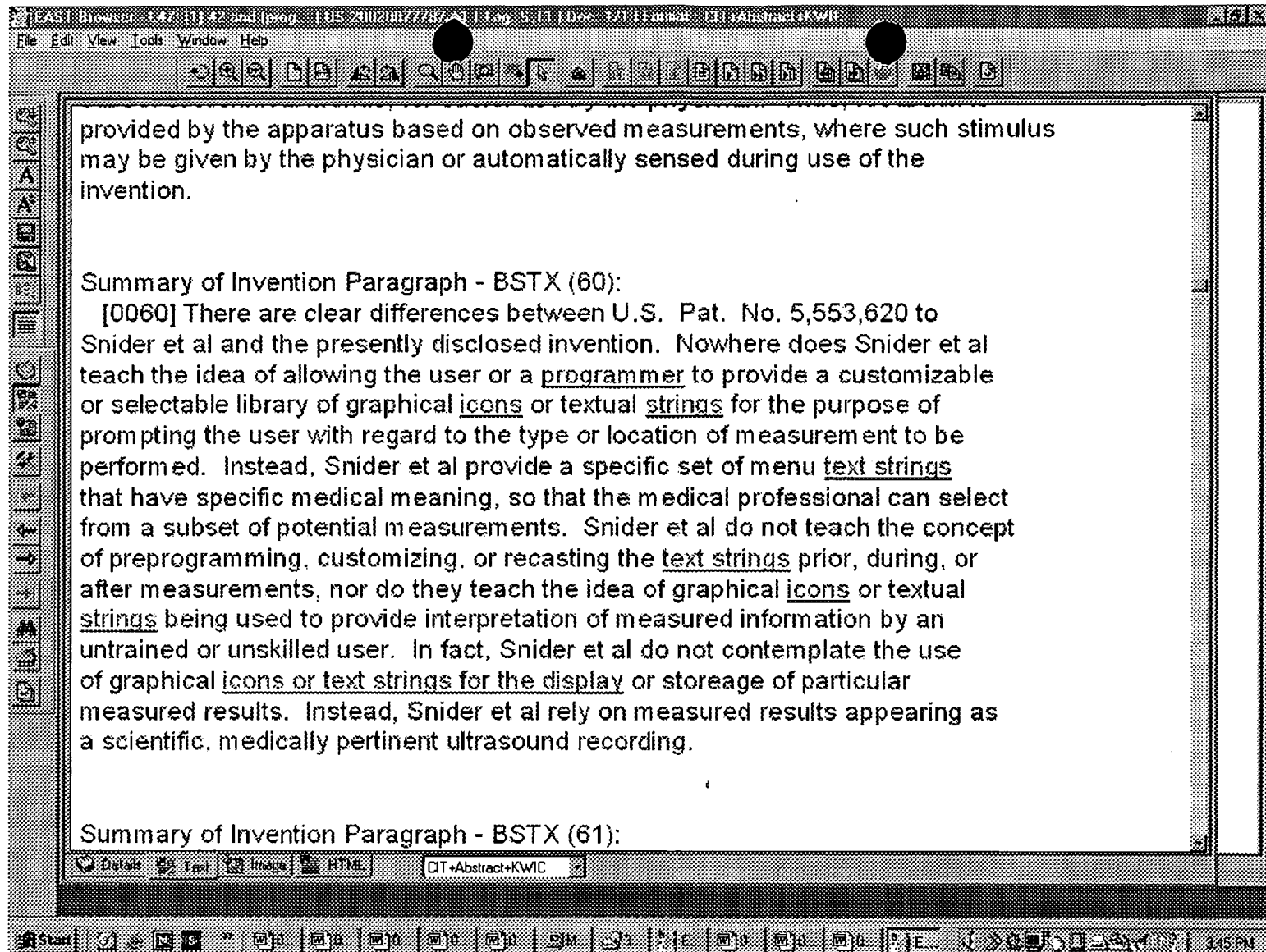
#### Summary of Invention Paragraph - BSTX (58):

[0058] U.S. Pat. No. 5,482,050 to Smokoff et al is in the area of medical instrumentation displays. Smokoff et al teach measurement results that map to a settable color table, and further teach that the location of the displayed color pixels may be positioned by the user on a display device. The invention also teaches that a program window may be minimized into an icon when a higher priority window or an alarm is to be displayed. Nowhere does Smokoff et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed, nor does Smokoff et al teach the idea of icons or textual strings being used to provide interpretation of measured information by an untrained or unskilled user. Furthermore, Smokoff et al do not provide any spatial information regarding the measurement or the measurement location.

#### Summary of Invention Paragraph - BSTX (59):

[0059] U.S. Pat. No. 5,553,620 to Snider et al is in the area of ultrasound imaging display. Snider et al teach using graphical measurement tools to allow a physician or medical examiner to simplify the ultrasound recording process. Based on the specific diagnosis of the patient, the invention eliminates particular menu or measurement options, and displays a subset of technical menus, for easier use by the physician. Thus, feedback is provided by the apparatus based on observed measurements, where such stimulus





provided by the apparatus based on observed measurements, where such stimulus may be given by the physician or automatically sensed during use of the invention.

#### Summary of Invention Paragraph - BSTX (60):

[0060] There are clear differences between U.S. Pat. No. 5,553,620 to Snider et al and the presently disclosed invention. Nowhere does Snider et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed. Instead, Snider et al provide a specific set of menu text strings that have specific medical meaning, so that the medical professional can select from a subset of potential measurements. Snider et al do not teach the concept of preprogramming, customizing, or recasting the text strings prior, during, or after measurements, nor do they teach the idea of graphical icons or textual strings being used to provide interpretation of measured information by an untrained or unskilled user. In fact, Snider et al do not contemplate the use of graphical icons or text strings for the display or storage of particular measured results. Instead, Snider et al rely on measured results appearing as a scientific, medically pertinent ultrasound recording.

#### Summary of Invention Paragraph - BSTX (61):

